Computerworld

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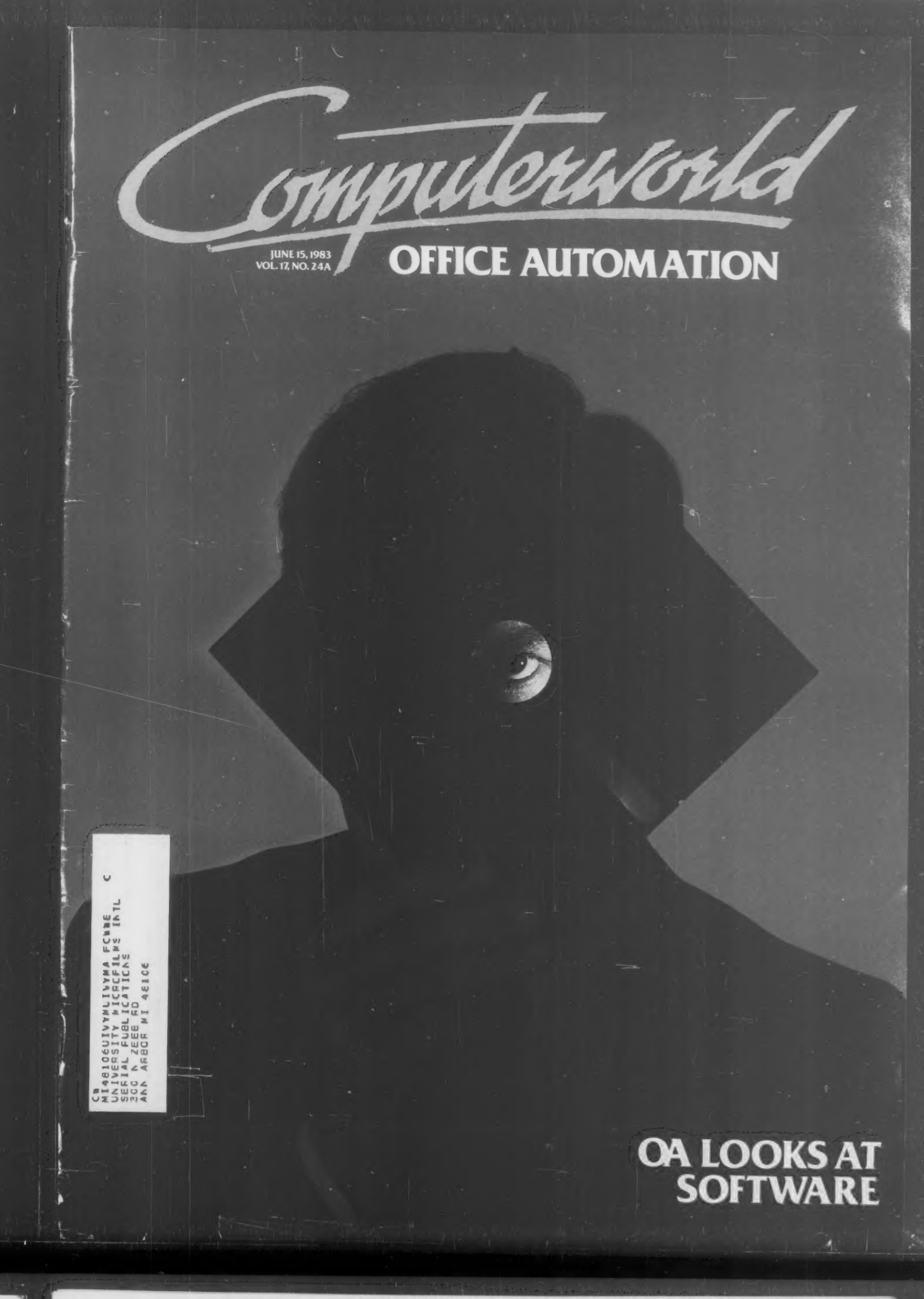
OFFICE AUTOMATION



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OA LOOKS AT SOFTWARE

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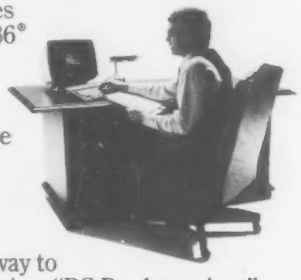

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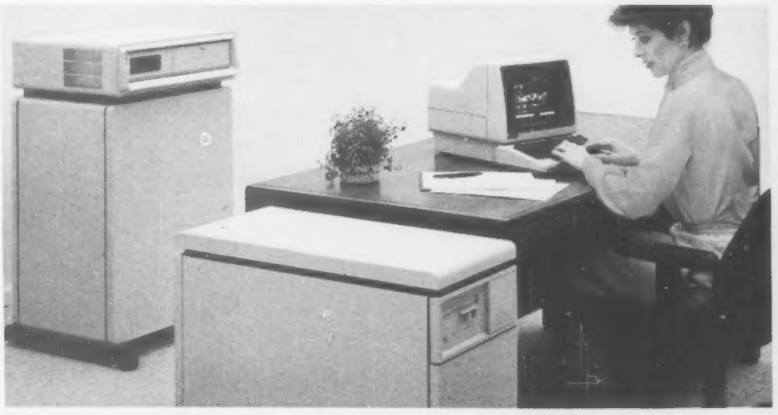

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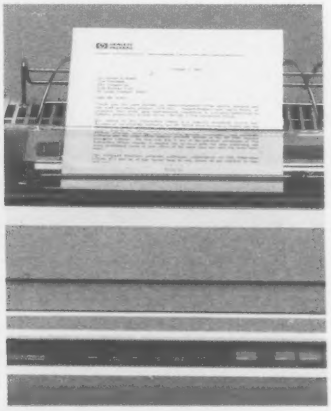

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Software is becoming a key OA issue for 1983. OA provides an eye-opening examination and analysis of what's available.

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OA

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FORUM

By George Martin

Articles, trade journals and promotional material that direct attention to the insertion of the personal computer into the business environment have neglected one area — training of management information systems (MIS) personnel. Because of their technical backgrounds, DP personnel are assumed to be both receptive and knowledgeable about the personal computer.

True, certain areas of the DP environment need not be explained to DP employees. However, it is too often forgotten that the microcomputer is the culmination of several tasks presently handled independently in the MIS environment.

The user of a personal computer will wear a lot of hats — data entry operator, programmer, computer operator and person in charge of quality assurance and report distribution.

As data entry operator, the end user will quickly be reminded that the only way this mass of information is going to enter the system is if he takes the time and effort to enter it. If the user is not adequately educated or aided in this area, he can lose track of the information entered. Manual procedures have to be designed to assure him that he does not enter information twice or accidentally bypass an important piece of information. In some cases, the implementation of balancing procedures or the reconciliation of batches will be necessary.

When donning the hat of the programmer, an end user must be made aware that beyond the generalized spreadsheet program he may be using is the need to logically address the relationship of one piece of information to another. This means organizing the information, laying out the actual printed document, coding the higher level language that is supported by the spreadsheet software and thoroughly testing the results. The user must remember that the work he develops will probably be part of his production routine and it must be accurate. His final responsibility as programmer is to establish a means of thorough documentation representing the work he has completed. This documentation must be thorough enough to direct others through his work and should be located in an area where it is readily available for review by those supporting his work.

As operator, the user must be physically familiar with the idiosyncrasies of the equipment and knowledgeable about the location of all diskettes and about which disks will be used with a particular piece of software. He must now "power on" the machine, place paper in the printer, load the diskettes to the appropriate drives and issue commands that start the program functioning. During the processing of the program, he must remain alert to the possibility of equipment problems and know how to correct the situation while ensuring the integrity of the data. Backups of processed information may also be his responsibility, with new diskettes transported and stored in remote locations.

He thought he was finished. Not so. The information has been entered, the program completed, the job executed, the report printed, the backup created and the current diskettes filed safely away. What now? Quality assurance! The printed output must be reviewed to see that the printer alignment is correct. Has it printed over a border or missed printing one of the all-important numbers on the report? He must also review those individual reconciliation amounts that he programmed in the report to be sure an additional unwanted condition has not arisen.

Now he can distribute the report. How many copies did he print? Are there now additional persons who would like to be on the list to receive a copy? As the user's imagination and abilities increase, more demands will be placed on him to supply additional timely and accurate information.

The MIS division will inevitably need to be the support of this new innovative industry trend, and the roles presently played by the DP staff may change as a result. In most medium-size to large MIS shops, programmers and operators have had very separate roles and career paths. In many cases, these individuals are truly unaware of some parts of each others' jobs and, to some degree, have no interest in knowing the details of the others' work.

Enter the microcomputer — the device that will require the user to know all aspects of the DP environment and will have to be supported by the MIS staff. It is time for us to take the time to instruct our own staff on the overall concept of the use of the new company tool. Instruction should be separated into individual departments within MIS, concentrating on the strengths and weaknesses of each group.

Actual instruction should involve the systematic approach covering the use of the machine, your organization's views on the machine's justification, the configuration to be used throughout the company, the new and possibly unfamiliar equipment, a discussion of available software and its distribution to the end user (including training) and, possibly, the role this machine may play in each department.

This training will by no means be as difficult as, for example, training the company marketing manager, but is every bit as important. In fact, because of the background of each group, the questions will be more direct and will deal with a level of detail you and your MIS division should be prepared to support.

If you take the time to involve your staff from the very beginning, you will ensure a much smoother road in implementing the microcomputer in your company. ♦ OA

Martin is personal computer project coordinator for the Missouri Farmers Association, Inc. in Columbia, Mo.

COMMENT

The problem with office automation is...

There may be as many answers to that statement as there are companies automating their organizations. But one generally agreed upon problem is that of incompatibility. So far, equipment manufacturers have left users hanging — unable to communicate with other vendors' machines and sometimes even within their own product lines.

But things may be changing in the industry. Hardware development appears to be reaching a plateau for the moment, and software and communications capabilities are beginning to be used as the hook to encourage users to buy. Integrated software packages, more sophisticated software for personal computers and micro-to-mainframe links are beginning to appear. In addition, in the last few months, a number of private branch exchange and computer manufacturers have started combining forces through joint product development or product endorsements in order to develop interfaces to switch data.

This kind of movement will profit both users and vendors. Vendors can enlarge their product offerings to attract new customers, while at the same time saving research and development monies. Users will end up with more choices and increased capabilities. Although this is just the first of many steps to come, it brings us closer to achieving the goal of an integrated office.

Congratulations — let's see more of the same.

A.D.

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COM'ON, STANLEY. WHERE'S THAT SIX MONTH BUSINESS FORECAST?
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SOFTWARE? IS THAT LIKE TUPPERWARE?
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NEWSBRIEFS

ANAHEIM, Calif. — John Imlay Jr., chairman of Management Science America, Inc. (MSA), kicked off the National Computer Conference (NCC) with an ovation-inspiring keynote address replete with Will Rogers humor, state-of-the-art visual aids and a concert violinist performing "The Impossible Dream." Four days, 650 vendors and approximately 100,000 visitors later, NCC '83 was history, although not everyone left Anaheim with fond memories.

Amid the new product announcements and countless informational sessions, it became increasingly clear that NCC was beginning to strain at its own enormity and that a reevaluation of strategy was in order for the American Federation of Information Processing Societies, Inc. (Afips), the show's sponsor.

Because of the limited floor space in the Anaheim Convention Center, Afips had set up makeshift exhibition tents in the Center's parking lot. When temperatures soared into the 90s during the show, the air conditioning system in the tents couldn't meet the challenge. As thermometers in the tents climbed to more than 110 degrees, visitors stayed away, equipment shut down and vendors' tempers flared. Lawsuits and walkouts were threatened before Afips officials managed to placate irate vendors with compromise agreements.

Afips has already announced that NCC will not return to Anaheim, site of several past NCCs. In fact, only two cities, Chicago and Las Vegas, have facilities large enough to handle the giant convention, one of the country's biggest. As if NCC '83 weren't hot enough to handle, NCC '84 is scheduled for July 9-12 in Las Vegas.

Honored guests at NCC were Dr. Gene M. Amdahl, Dr. John Kemeny, Dr. Richard I. Tanaka and Captain Grace Hopper.

New York, N.Y. — Executives who lack basic DP skills may soon find themselves unable to compete in today's job marketplace, according to a study done by the Robert Half International, Inc. recruiting agency.

According to the report, of financial executive openings in the $35,000 to $65,000 range submitted by employers during the first three months of 1983, 85% required some DP training or experience and nearly half made some computer knowledge a definite requirement.

More information is available from Robert Half International, Inc., 522 Fifth Ave., New York, N.Y. 10036.

NORWALK, Conn. — You have to know when to hold 'em, know when to fold 'em and know when to log on (with apologies to Kenny Rogers).

Televised gambling services may be the answer to get consumers to access teletext and videotex, according to a prediction made by the research firm International Resource Development, Inc. (IRD). According to the 314-page report called "Teleshopping," the use of teletext and videotex could result in "one-stop gambling." Of course, the report points out, all this would have to be legalized first.

The report is available for $1,285 from IRD, 30 High St., Norwalk, Conn. 06851.

SANTA MONICA, Calif. — The computer graphics industry will grow to $8 billion by 1986, according to a research report by the International Data Corp. (IDC).

The study, "Computer Graphics Industry Statistical Reference Book," analyzes major market trends including changes in computer-aided design and manufacturing application and production mix; emergence of image processing applications; gradual increase of business graphics usage; and explosive growth for graphics peripherals, including displays plotters, digitizers and cameras.

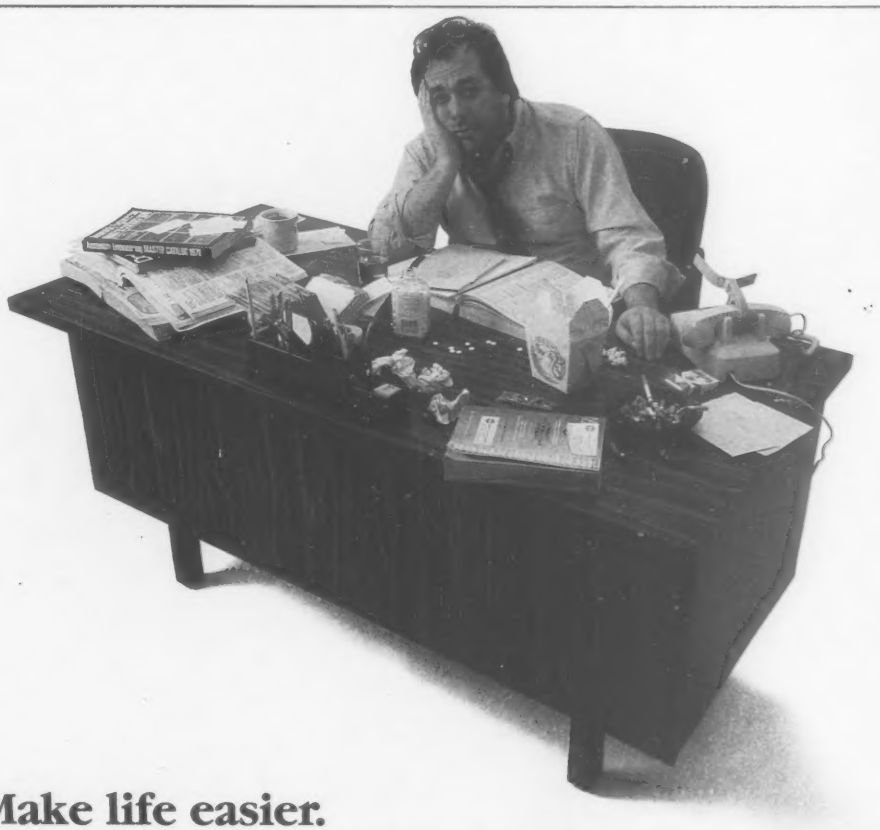
The report is available for $2,500 from IDC's Pacific Technology Center, Suite 101, 1448 15th St., Santa Monica, Calif. 90404.

PHILADELPHIA. — High-tech firms are giving their workers stock options, bonuses, cash awards and recreational facilities to increase incentive, according to a recent survey by the Hay Group, a consultant organization. Among the examples of enticements: Advanced Micro holds drawings for cars, televisions and houses when it meets sales goals; Data General Corp. awards cash and stock to software programmers; Intel Corp. provides discounts on stock purchases; and Rolm Corp. has a $1.5 million recreation center for employees, offering tennis, swimming, jogging and racquetball. The survey of 21 of the largest high-tech companies showed that 67% used stock plans as incentives, more than double the rate found in industry generally.

For more information, contact the Hay Group, 229 S. 18th St., Philadelphia, Pa. 19103.

Correction

In "The Color Caper," by Robert Varga (CW OA, April 20), Varga's company, Ramtek Corp., was mentioned as having its headquarters in McLean, Va. The company is actually located in Santa Clara, Calif.



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OA Solutions, DP Lessons

Technologists and end users split into separate specialties as DP developed. The time to merge is now.

By Pat James LaBarbera

PHOTO © 1983 ED BRAVERMAN

We've been trying to automate the office for a long time now. The business community has been reading and hearing about the "paperless society" practically from the first day it was bitten by the byte — and it has been biting the bullet ever since. This does not imply that DP has failed; it just has not succeeded as much as it could and perhaps should have.

It would be a costly mistake to think about office automation as though it were something new, different and more promising than the automation of the past 30 years. We face exactly the same set of problems in implementing office systems as we faced implementing mainframe systems. Unless we change our approach, history will repeat itself. Office computers may in fact increase the cost of doing business.

Part of the problem lies in the definition of automation: a system or method in which processes are performed or controlled by self-operating machines. Current emphasis is on "self-operating" instead of "system" and "method." Business is being led to believe automation is synonomous with automatic. Nothing is further from the truth. A machine is simply a tool, and its effectiveness depends on the ability of the individual using it. If we've learned anything during the past 30 years, it is that increasing the power of the tool does not produce a corresponding increase in the tool's effectiveness.

Imagine that it is 30 years ago. (Those of you who were around 30 years ago can just remember.) In preparation for the delivery of your first general-purpose computer, you are pulling personnel from key departments — accounting, personnel, payroll and so on — and sending them to school to learn systems and programming. This training was part of the bundle the machine came in. A considerable amount of hand holding occurred between vendor and customer because of the double problem of learning the machine language and learning how to use it to produce systems.

Problem definition was not a significant problem; the person defining the problem was the person with the problem. They served in a dual capacity: user and provider. Communicating was easy because these dual-faceted people spoke two languages: that of the machine and that of the user of the machine. A lot of good systems were developed in this environment.

As time passed, however, it became painfully evident the machine was a tough exactor, and it decreed that no man could serve two masters. Computer technology was advancing at breakneck speeds, and all of an individual's mental capacities were required to keep abreast of them. It was no longer possible to keep one's fingers on two pulses.

With technological advance, unit storage costs were reduced and hardware proliferated. That proliferation was accompanied by an invasion by the Mongol horde of machine specialists who spoke only a foreign language: that of the machine. Right then and there was created the biggest problem business has had to face: communication.

As machine technology advances, the relative cost of the machines decreases. However, the personnel investment necessary to use this technology increases dramatically. Worse yet, so sophisticated is this technology that it has spawned a new class of people. They are adept at interacting with the machine, but they are losing the ability to interact with others. The resulting communication problem has already reached epidemic proportion and shows no sign of easing.

Nothing management has tried to do has remedied the situation. New methodologies, all-knowing consultants, prepackaged software and endless DP reorganization have all been attempted, but they have not reversed the trend. The tool is still waiting to be used.

If OA is ever to become a reality, it must be clearly understood that the first step toward OA is to put the tool into the hands of the individual with the problem. This is exactly the reverse of business' traditional role in relation to DP. Users are separated from providers by an impassable technological gulf. To narrow that gulf, users must learn the technology — not complex mainframe technology, but the vastly simpler technology of office computers.

Hardware vendors have failed in this area. They have proclaimed, with an unprecedented volume of fanfare, that automation has arrived. The future is now. The office is metamorphasized, instantly.

Baloney!

Nothing has changed except the advertising. The basic problem is still with us: how do we use the machine as a systems tool to do work currently being done manually? By cleverly promoting a panoply of gimmicks — such as electronic mail, executive calendars and electronic filing — hardware vendors have neatly

sidestepped this real purpose of the machine. Instead, they are promoting a fetching piece of office furniture not much more effective than a memory typewriter.

The fact is that an office computer is still a computer. As such, there is nothing simple about it. As a sophisticated, complex piece of hardware, it requires a significant investment of time if it ever is to be used effectively. By shrouding these machines in "user-friendly" blankets, manufacturers have managed to pull the wool over the eyes of the machine buyer.

Office computers are related to their big brothers in many respects. They are not suited for volume processing, but volume processing has already been taken care of on the mainframe. On a smaller scale, they can be far more effective for small systems development than mainframes have been for large systems. Unfortunately, by creating an artificial distinction between word processing and data processing, vendors have neglected to promote machine features that can deliver this effectiveness

Most office computers have optional software that allows list or records processing, math and sort. Vendor demonstrations of these features are the most primitive displays of office systems imaginable. They show how columns of numbers can be added, how a file of names and addresses can be used to produce customized letters and how you can produce those same letters on a selective basis. One file might even be used to produce two different reports.

You will also be told the only restrictions on what can be done with these machines are the imagination and creativity of the user. This is true. It is also true that no amount of imagination and creativity can solve a puzzle with 85% of its pieces missing.

The major consideration is completely glossed over. These machines can function as systems tools, but that is not mentioned. The subject is avoided scrupulously, because "systems" is equated with "data processing," and data processing historically has been a deep, black hole. Nor will training help you. Typically, training for office comput-

ers consists of two to five days of class instruction in word processing and the rest is up to you. The practical consequence of this marketing approach is that most office computers are being used for WP, which utilizes about 15% of the machine's power.

Users are not being told that:

- These machines can reduce the communication barrier between man and machine.
- They can make data electronically available to mainframe systems.
- Implementing office systems on these machines can dramatically reduce the fact-finding phase of mainframe systems development.
- These machines are ideal for recording source data and for using that data at its source.
- These machines are suited for coping with change — one of the biggest problems in mainframe systems.

Office computers can do all this, but not until two critical factors — the tool and the application of the tool — are better understood. Fortunately, neither requires a disproportionate amount of time before significant results can be achieved. Unlike the mainframe situation, where a neophyte is considered worthless for six to eight months, office personnel can effect savings in a matter of days.

Let's deal first with the tool. The vehicle for storing data electronically is the record. Office computers are commonly thought to be inefficient at processing records. They are slow, encumbered by file size restrictions and have little of the logic capabilities of their big brothers. However, all these factors are relative to the extreme mainframe speed necessary to process large volumes of data efficiently. In assessing a computer's applicability to the office, however, the relativity of the work they will do must also be considered.

Office computer speeds should not be compared with the speed of mainframes; they should be compared with the speed of manual processing. DP has traditionally gone after volume and clerically intensive applications. This was necessary in order to justify the enormous expense of establishing and maintaining a DP operation. The resulting residue of work, typified by low transaction volume, minimal clerical costs and infrequency or irregularity of processing, was left untouched.

It is a mistake to think this kind of work does not represent a significant portion of an organization's total operating expense. It would be a rare company, indeed, whose DP expense was greater than its total clerical expense. The fact that this work involves small transaction volumes should shout that a correspondingly small machine should be employed to tackle it. Hardware vendors do not stress this kind of office computer applicability. If they did, they

would have to deliver the appropriate training, which they are either unable or unwilling to do. Even though the problems are, in miniature, the same as in the old days, there is no hand holding between vendor and customer. Machines are being sold, apparently, on their face value alone.

File size restrictions are also frequently mentioned as a weakness of office computers. Again, file size is crucial in mainframe systems — the bigger the file, the more that can be done. But in office systems, large files are not usually necessary. Typically, they run to the hundreds and it is the rare office record that exceeds more than 300 characters. Mainframe files run into the thousands and even millions of records, with record size going into the thousands of characters. Mainframes require the capability to handle this file size and volume. Office computers do not.

A comparison of systems functions of office computers with those of mainframes reveals one main difference. To work, mainframes require a language, for example, Basic, Cobol, Fortran, Pascal or assembler. In addition, a knowledge of the machine's operating system is necessary, and this can be more difficult to master than the programming language. Both the language and the operating system are highly structured, demanding and require scrupulous discipline in adhering to their rules. No margin for error exists. The detail involved in programming a large system is enormous; even an accomplished programmer will need man-years

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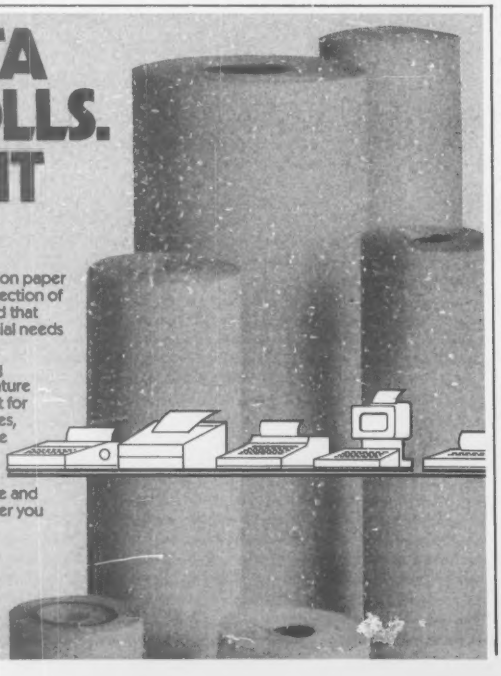

to develop it. No wonder there is such a resistance to change.

Office computers, however, have a built-in capability to perform functions that mainframes must be programmed to do. Neither the language nor the operating system of an office computer need be apparent to the user. Instead of requiring an knowledge of programming and operating system detail, they require only an understanding of the machine's operation — negligible by comparison. They do not require precise field definition. A field can be as long as you want it to be. They do not require consistent record size or format; one record can be 100 characters long, the next, 300.

The subtle but significant difference is that the operator directs the machine without any interface or intermediate programming step. The results can be seen almost immediately. No program has to be changed. No compilation has to be made. Systems can be developed on a trial-and-error basis, beginning with simple problems and working up to more complex applications without worry about rewriting anything.

The machine itself is comparatively simple. The concept of file and record and their relationship to data manipulation can be and is taught in a matter of hours. However, it is taught in an extremely restrictive manner that conceals its real worth. Teaching an individual how to prepare customized letters from a list of names and addresses can be accomplished in a single morning. It is seldom mentioned that this technique can be extended to the more prevalent problems office workers face every day, and which are solved manually. If the office is viewed as an information processing locale, it is incumbent upon the office to be able not just to process information, but to process it electronically. The difference is significant because of the one enormous advantage machine systems have over manual systems — storage.

At least in theory, when a piece of data has been stored electronically, it can be accessed and used repeatedly. The obvious advantage here is that if the data is initially entered correctly you need never worry about transcription errors. The not-so-obvious advantage is that data captured in memory becomes a data base and, even with small office systems, an extreme range of information can be disseminated from it. This is not true of manual systems. In a sense, data is locked into manual systems; each time it is needed it must be unlocked, and the unlocking is costly.

Information results from the combination of different bits and pieces of data that abound in an organization. The more flexibility one has in combining this data, the more information will be available. No one, two or 10 pieces of data can be relevant to anything unless put into the context of the entire operation.

How then can this office tool be applied? A system, any system, involves the interplay of forces working in concert and subordinate to the whole. Because the computer is a complex, sophisticated machine, the discipline has become forceful enough to become insubordinate — and unfortunately, to get away with it.

System has come to mean no more than computer system, and systems analyst no more than computer systems analyst. In the process, the business community is losing its most valuable element, the collective intelligence and imagination of the majority of its work force. It is time to reverse this trend. It is time to put technology in its proper place — in the hands of everyone — not just the technically elite. But this time around, let's be sure to keep the tool in perspective. It is not an end unto itself; it is a means to an end.

Manual systems can be quite effective; more than one individual has said he was better off before automating than after. Most departments have at least one person who possesses a natural sense of order and logic, thinks about the job at hand and is responsible for the development of excellent manual systems. These people possess a natural systems ability. This, combined with an in-depth knowledge of the information requirements of the department, can make a powerful contribution toward increasing productivity. Add an office computer, and you now have the ingredients to begin an OA program. The one requirement is that this computer cannot be so complex it will take forever to master. OA defeats its purpose if specialists must be brought in on a regular basis to do the study, design and implementation. History begins to repeat itself, and any productivity gains are going to be offset by the cost of importing specialists.

The office computer must be powerful and fast, have a large storage capacity and be learnable in a reasonable period of time. If these conditions are met, automated office systems can be developed with a technique closely parallel to that of developing manual systems. An obvious relationship exists between manual and automated functions of filing, extracting and updating records; sorting; performing arithmetic; and printing reports. Because an office computer is relatively simple, little danger exists that skills will be necessary before they have been mastered. With proper instruction, the learning process is condensed into a short period, and the point of payback is reached much sooner than with mainframe automation. Office computers will never replace mainframes; nor were they intended to. However, they can augment mainframe development in some not so obvious but nonetheless effective ways. Small automated systems will be developed, employing techniques essentially related to mainframe development. From these systems, a series of prototype systems will evolve. These in turn will allow the transition to larger integrated systems with only a fraction of the historical confusion attendant on such efforts. Because they routinely use file and record concepts, users will be significantly more informed and much more functionally aligned with the overall DP effort than at present. OA developers will have taken a big step toward narrowing the communication gulf that currently separates the DP and the office. This won't happen today, tomorrow or next week. But it is a beginning.

The final and perhaps the most attractive aspect of office computers is how easily they can be cost-justified. Guesswork and pie in the sky predictions of cost effectiveness can be abandoned. The approach is quite simple (see "Cost-Justification," above).

You won't get too much help from machine vendors, but you really don't need what they've got because what they've got is hardly enough. Make sure you buy the machine that has the most powerful systems package; when the vendor starts talking about the machine's DP functions and how Basic or any other kind of language can be run, tune them out. Don't let yourself be diverted. Your goal should be to acquire hardware that has systems functions without any of the hassle traditionally accompanying the learning of these functions. List or records processing, sort, math and communications are the functions that fit the bill precisely.

The final curtain has yet to fall on this unfolding drama. Its producers — the thousand of companies that will invest billions of hardware dollars before this decade ends — should play a more active role in its direction instead of passively accepting OA promises as revealed truth. If this happens, the final curtain will fall on a happy, not a tragic, ending. OA

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LaBarbera has more than 20 years DP experience, including jobs ranging from junior systems analyst to vice-president of DP. He is the founder of Office Computer Systems, a consulting firm in Birmingham, Mich.

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The Information Center: Oasis Or Mirage?

By Glenn Rifkin

Has the information center solved the data processing applications backlog or is it merely adding another chorus to the DP blues?

In the past three years, more than 400 corporations have opened information centers designed to serve end-user needs and ease DP backlog. Although most centers are still too new to have provable results, companies that have gone that route seem uniformly pleased with the early feedback. Yet some industry sources question the effectiveness of

the information center in reaching its stated goals.

In a recent *Computerworld* survey of 411 DP managers, more than half stated their number one problem is still applications backlog. It may be that the hype surrounding information centers as a quick-fix for DP is causing some managers to view them as the ultimate solution, rather than as just another tool. No matter how successful the center becomes, these managers are bound to be disappointed.

Others maintain that the information center has actually fulfilled its promise too well. The center is so effectively educating end users to the advantages of automation that it has actually created more, not less, of a demand on the DP department, a report by International Data Corp. (IDC) suggested. "The Information Center in Large Organizations" predicted that satisfied users will head to the DP area with increased demand for new, more complex application developments.

"If the objective of the information center is to reduce backlogs in DP, additional actions must be taken that go much further than simply providing end users with appropriate products and services," the report stated.

But most managers of successful information centers don't agree with the criticism. They contend that their centers have helped reduce DP backlogs and are filling the void that has long frustrated the end user. The centers are reportedly opening

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up corporate data bases to users — many for the first time. The application requests these users are bringing into the center most often are concerned with the business area, so that the information center also acts as a natural bridge into office automation for the organization.

Howard Goldberg, information center manager at Shaklee Corp., a San Francisco-based vitamin and personal care manufacturer, has seen a direct effect on the DP backlog. "The information center has definitely had an effect on DP backlog. One department, for instance, used to have a lot of requests for enhancements and reports from DP. Now they come to the information center and that backlog is zero. A lot of people who wouldn't have gotten help from DP are now satisfied."

As users become more educated in technology, their perceptions of what can or cannot be accomplished may undergo some drastic revision. Their resulting requests may also be changing because of interaction with the information center. Karen White, information center supervisor at the California State Auto Association, has also witnessed a drop-off in DP backlog. When users come to the center for help and realize they must get involved and devote significant time, the projects seem to lose their importance.

On the other hand, Lynn Sheridan, information center supervisor at Hartford Steamboiler Inspection and Insurance Co., has seen more than half of the company's 250 employees come through the center's doors since its inception three years ago. After distributed word processing was installed throughout the corporate headquarters, the center became more visible and attracted user attention.

Sheridan said she doesn't believe the educated end user will put more of a burden on DP. The end user who comes to the center has more demands, but the demands are more reasonable. Having a better understanding of what can be done has allowed end users to design the work themselves and turn it over to DP.

Dave Lathrop, manager of information and technology for Mervyn's Department Stores in San Francisco, agreed. "We can handle the requests now, and we've seen some that were never articulated to the MIS before. But we haven't seen what it will be like once we whet more appetites. It could go too well, but my guess is that the better educated user will make more pointed practical requests."

Users appear to be asking for a number of applications previously difficult or impossible to receive from the DP area. Ad hoc queries and ad hoc reports from such departments as personnel, accounting or research are among the most requested applications from information centers, according to center managers. A reasonable way to access corporate data bases has also been high on the request list.

But how do the users themselves view information centers? Paul Smietana, a financial analyst for Household Finance Co. (HFC) of Chicago, said he is pleased with his experience and will certainly go back for more assistance. However, the positive results have not spurred him on to create massive applications requests for DP. "I needed to create reports on cash flow and cost benefits analysis and I was really bogged down. I went to the center and took a course in the financial planning package. Once I learned it, I designed my own report. Doing it manually took more than four hours; now it can be done in 10 to 15 minutes. No typing is involved and I end up with a neat and presentable report. There's a lot of flexibility using the center."

At the Essex Group, a Fort Wayne, Ind., subsidiary of United Technologies, Vicki Churchwood also turned to the information center. Churchwood, executive secretary for the director of strategic planning, had to help develop a forecasting tool for strategic planning. At the center she was encouraged to participate in solving the problem. In addition to the time saved, Churchwood noted that "if you are going to use a finished product, the best way is to learn to do it yourself."

"We had no idea what the computer could do for us," added Julie Krich, a tax accountant for HFC. "We had to construct a tax calendar for the entire company and doing it manually would have been impossible. Without the information center, we would have been beating our heads against the wall."

The push toward OA is of major concern to many information centers. Most mature centers, according to industry expert James Martin, are already involved with OA activities.

At the Essex Group, F. Richard Lennon, director of MIS, initiated a center in 1981 with the short-term mandate to provide more data to end users for less cost and to decrease the backlog for the MIS department. Overwhelmingly pleased with those results, Lennon has taken a look at long-term goals: "The information center will serve as the vehicle for transitioning our organization into office automation. And it will be the focal point to acquire management support for the charge toward OA."

One of Essex' first projects has been a blending of the traditional information center concept with an aggressive personal computer program for United Technologies' 1,100 executives. Lennon said that by making the company's executives fluent in technology, they will lead the OA charge. "We agreed the center would be the best place to handle the assignment." Micro experts were added to the staff and the information center is acting as a "kind of broker" for the company.

The HFC information center has served more than 75 users since its inception in September 1981, and its major project has been to put together a pilot plan for OA. According to Dan Hennessey, project manager for the center, the plan is scheduled to be in place this summer.

The use of the information center as a jumping off point for OA, while a seemingly sensible integration of ideas, is a divergent path from the concept's origins. The concept evolved amid the DP backlog dilemma of IBM Canada in the mid-1970s and found a warm welcome from Big Blue customers south of the border.

According to the IDC report, "in its most original form, the information center is a mainframe-based strategy designed to solve the end-user/data processing dilemma by allowing users to develop many of their own applications programs through the use of non-procedural language application designed for large CPUs.

"Today, the information center is freely developing on its own, away from the original IBM advocates. Directors and staff of existing centers are no longer dependent on IBM, for they now have the experience to guide their organizations through the present multivendor environment."

"The end user who comes to the center has more demands, but the demands are more reasonable. Having a better understanding of what can be done has allowed end users to design work themselves and turn it over to DP."

The search for end-user solutions in the multivendor environment has indeed taken on the proportions of a jigsaw puzzle. "We're at a crossroads," Lennon said, regarding the role of MIS managers in ushering in automation to their organizations. "We know where we want to go — toward better information flow and better end-user tools — but how you get there is still unknown. There are 5,000 remedies out there. The challenge is to figure out your goal, start on a course and avoid misdirections. It's a difficult situation."

Still a relatively new concept, the information center would be unique if it did not face problems in acceptance and capabilities. Many center managers have had to confront suspicious DP departments that traditionally had full reign over all information pro-

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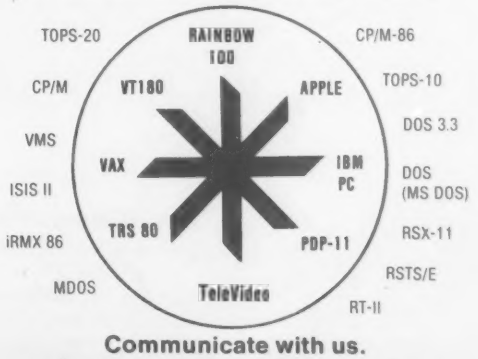

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cessing within the organization. According to Lennon, a great amount of reluctance existed within the DP area about accepting the center. "We were perceived as a threat to work them out of a job. We had to spend a lot of time convincing them that the center was in their best interest."

"A lot of times, what's good for the end user may not be good for DP," Hartford Steamboiler's Sheridan said. "If I add 100 users, DP needs to add another disk drive. If I want to add a data base query language, they look upon it as another drain on the system. They look at the costs. It may not be cost-effective to buy a fourth-generation language, but I can see a lot of end-user benefits."

Although most centers have suffered early growing pains from within DP as well as from the end users themselves, the concept seems to be a most welcome addition to corporate computing. Those who believe the information center offers a panacea for solving all of DP's woes, however, will probably remain disappointed. As the centers gain acceptance, it is clear they will be of great benefit to the end user who could not break through the DP wall. But clearing up a DP backlog going back three or four years is obviously more than even a solid information center can handle alone.

The bottom line on the information center may be in dollar savings. "A lot of people who couldn't have gotten help from DP are now satisfied," declared Goldberg of Shaklee. "For every $3 spent on the center, the company is getting back $5."

Indeed, the information center concept is gaining acceptance so rapidly — Martin predicts more than six million users will be served by centers by 1990 — that the center itself may develop a backlog crunch. Taking off the pressure from DP departments in terms of walk-in end-user application needs has proven to be a consuming task in its own right. Becoming the spearhead for OA as well may add a significant burden for the information center if the staff does not have a well thought out strategy.

Though the information center is ready to provide virtually all end-user tools, the introduction of nonprocedural or fourth-generation languages within organizations has been the foremost accomplishment. Many of the centers, founded on the IBM concept, are using such IBM products as ADRS, APL, GDDM-Graphics and Stairs. As center managers become more acclimated to their specific needs, they are finding that an army of non-IBM products — decision support systems, application development software, query languages and report generators — are available and, in many instances, preferable.

Among the packages finding great user acceptance are Infodata Systems, Inc.'s Inquire, SAS from SAS Institute, Inc., Ramis II from Mathematica, Inc., Pansophic Systems Inc.'s Easytrieve and Nomad from National CSS, Inc.

"Those who believe the information center offers a panacea for solving all of DP's woes, however, will probably remain disappointed."

According to the IDC report, however, "many of the fourth-generation languages are just not user-friendly. In fact, many are significantly complex and require considerable staff time.

"In addition, if the information center requires more than one language, which is typically the case, there are often many different sets of commands which end users must learn in order to be able to use these languages efficiently."

Lathrop of Mervyn's Department Stores is still looking for the best nonprocedural language to add to the information center. "ADRS is just not able to handle all our needs. We're looking for something that's easier to use. A lot of the software we use was in the company before we formalized the center. We just had to adapt with what we had."

Adapting is, perhaps, the information center's foremost challenge.

"We had to make a choice," stated Lennon. "All of this was going to happen anyway, so we could either lead the charge or get overwhelmed. We simply had to open doors, not shut them." OA

Rifkin is a staff writer for Computerworld OA.

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Artificial Intelligence

By E. Robert Keller II

Harried users may find AI provides an intelligent assistant in the office.

Software packages such as Micropro International Corp.'s Wordstar, Mathematica, Inc.'s Ramis, Lotus Development Corp.'s 1-2-3, Infodata Systems, Inc.'s Inquire and dozens of others seek to put the full power of modern computers at the

ILLUSTRATION BY RICH TENNANT

fingertips of the non-DP end user. Without exception, however, these fourth-generation languages suffer from two major shortcomings:

- The computer access they provide is not sufficiently user-friendly to allow full use of computers — whether mainframe or micro — without training and regular usage or skilled assistance.
- Each provides only limited functionality within itself and is not integrated with most other systems in any convenient way.

A new generation of software is promising to allow the truly untrained end user better integrated access to the computer, easily and without technical assistance. I refer to those systems whose theoretical underpinnings are in the field of artificial intelligence (AI). Nowhere is AI needed more than in the office, where hundreds of thousands of office workers scramble to assemble, interpret and assimilate billions of bytes of business data daily.

The definition of AI depends on whom you ask and what you want to do. The answers may be in terms of programming techniques, system capabilities or some more philosophical considerations. However, most workers in the field would agree AI means trying to understand the mechanisms underlying intelligent human behavior and to emulate that behavior using nonhuman means such as computers.

Computer scientists have long been fascinated by the computer's vast potential for removing the burden of detail work from humans; AI carries this potential a giant step further. It is becoming possible for computers to emulate the human processes of natural language understanding, of conceptualizing complex situations, of making reasonable logical inferences and of finding the best solution to a problem without knowing ahead of time exactly what is meant by "a solution."

"AI research has made some very impressive functions practical, and some of them have important implications for the office."

Such capabilities suggest that, given a comprehensive base of knowledge about an area of interest, the computer can become an intelligent assistant in many facets of life in the office. In fact, because of its incredible speed and its ability to consider many factors consistently, the AI-based decision support system may be able to make decisions more quickly and more reliably than a human.

Fear not however, that the computers are about to replace humans altogether. In fact, AI is still in its childhood. The same myriad of potential applications of AI that makes the field exciting is also responsible for its greatest problem: no known overriding paradigm of human behavior exists to emulate. We cannot, for example, explain creativity. Nor can we explain how a person who hears a continuous stream of sounds from another person can perceive them as a meaningful utterance. Until we can explain such things, we cannot hope to program a computer to do them with a skill approaching that of a human.

As a result, AI work tends to be fragmented, focussing on many relatively narrow application areas. Still, AI research has made some very impressive functions practical, and some of them have important implications for the office.

Practical attempts at AI systems have addressed numerous application areas including robotics, natural English understanding and knowledge-based expert systems. There have been many prototype AI systems and some one-of-a-kind systems are at work in business today.

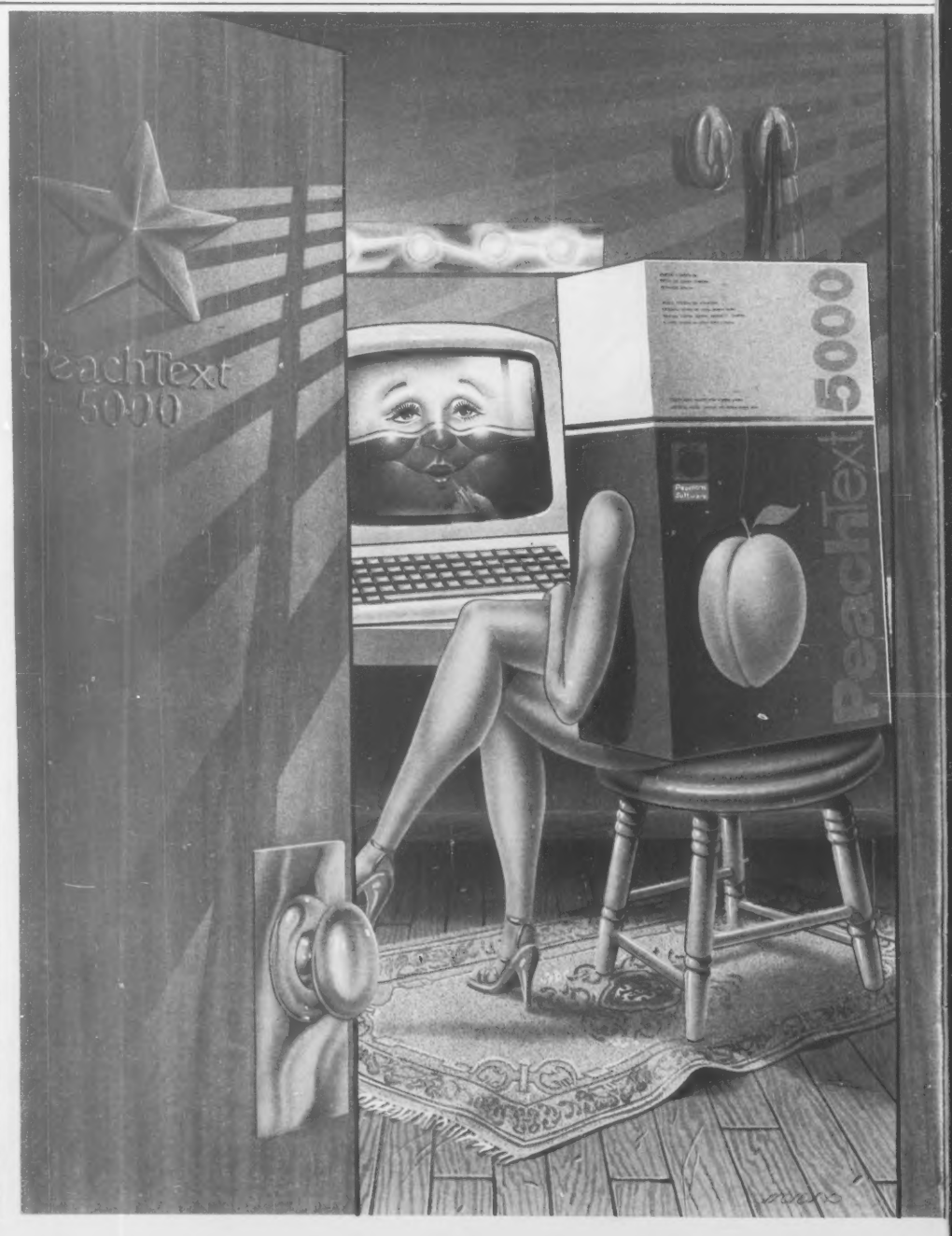
A few systems are entering the marketplace as off-the-shelf items and are mainly emphasizing the understanding of natural English. The Intellect system from Artificial Intelligence Corp. (AIC) is currently available off-the-shelf and, by the end of 1983, commercial releases from Symantec and Cognitive Systems, Inc. are expected.

Saying that computers understand natural English doesn't mean much until we know what is meant by "understand" and until we know what the computer can do with its understanding. For humans, English is a means of communicating experiences and making our wishes known to others. One important reason for having the computer deal with natural English is to approach the goal of putting end users in direct communication with the computing machinery they need in order to do their jobs.

In the office environment, two reasons we might like to communicate with the computer in English are to ask ad hoc queries and to dialogue with an expert adviser in various subject areas. These are now becoming possible.

Using natural English to make ad hoc requests of data bases is the most widespread current application of AI in the office. In this context, understanding natural English means translating a user's request into the computer commands necessary to retrieve specific information from one or more data files, to process the selected data in various ways and to display the processed data in a user-requested form.

Users can enter questions in very free-form English, but are not constrained to using good



grammar. A natural English system should be able to understand: "Show me the salaries of people working in Chicago as secretaries." Or simply recognize that "Chicago secretarial salaries." is the same question.

In addition, the natural English system is sensitive to ambiguity in a user's question, and it may request clarification from the user. A question such as "Who lives in New York?" is ambiguous. The system will respond:

DO YOU MEAN:
1) NEW YORK CITY
2) NEW YORK STATE
PLEASE ENTER THE NUMBER OF YOUR INTERPRETATION

However, a question such as "Who lives in Buffalo or New York?" is not ambiguous, and the natural English system is smart enough to know that New York City is intended in this case.

The beauty of natural English in this type of application is that no matter what data base management system or other software is used to do the work of selection, processing and display, the end user needs to know only one language, English. The natural English system becomes an operating system at the end-user level. It allows the user to access, through English, all the functional software in an information center, and it integrates that software to make data structure and processing transparent to the end user. The natural English system is the hub of the information center.

In an adviser system, understanding natural English means the system has a base of expert knowledge to which a user's statements and questions can be related. The purpose of an adviser system is to use its expert knowledge to assist the user in performing some task, for example, filling out federal tax returns. Using natural English here serves the same main purpose it does with ad hoc query systems: Because the user needs only English to use the system, he is free to focus on solving a problem without having to worry about how to use the computer.

Let's look now at a sampling of the companies currently producing AI software for the office: AIC, Symantec and Cognitive Systems.

AIC's Intellect system provides natural English query capabilities in the IBM mainframe environment. It runs under several operating systems including MVS, VM and DOS. On-line access to Intellect is available through CICS, TSO, CMS and Software AG of North America, Inc.'s Com-Plete. As to sources of data, Intellect can be used with its own Derived File Access Method (Dfam) if a customer wishes to use sequential data files, and it can also work with native Vsam, Adabas and SQL files.

In addition to direct sales by AIC, Intellect is available through several OEMs and service bureaus. Cullinet Software, Inc. (formerly Cullinane Database Systems, Inc.) calls Intellect On-Line English (OLE) and through OLE allows access to IDMS data bases. Information Science, Inc. (Insci) sells Intellect under the name of GRS Executive for access to Insci's human resources packaged software. Management Decision Systems, Inc. allows access to their Express decision support system using Intellect under the name of English Language Interface (ELI).

In addition to its built-in functionality, Intellect also interfaces directly to IBM's Presentation Graphics Facility. This interface is part of AIC's long-range goal of making Intellect the hub of the mainframe information center.

In the third quarter of 1983, Dictaphone Corp. plans to release CP/M-based Straight Talk on its System 6000 word processor. Straight Talk, a product of Symantec of Sunnyvale, Calif., retrieves and presents data in response to natural English queries. A long-range goal of Straight Talk's developer, Gary Hendrix, is to make his system the hub of the microprocessor information center.

Straight Talk currently deals with a somewhat smaller subset of English than Intellect does, but it goes an impressive step beyond Intellect in having the ability to learn new words and concepts during a query session. For example, if I were using a personnel

"The natural English system becomes an operating system at the end-user level and allows access, through English, to all the functional software in an information center."

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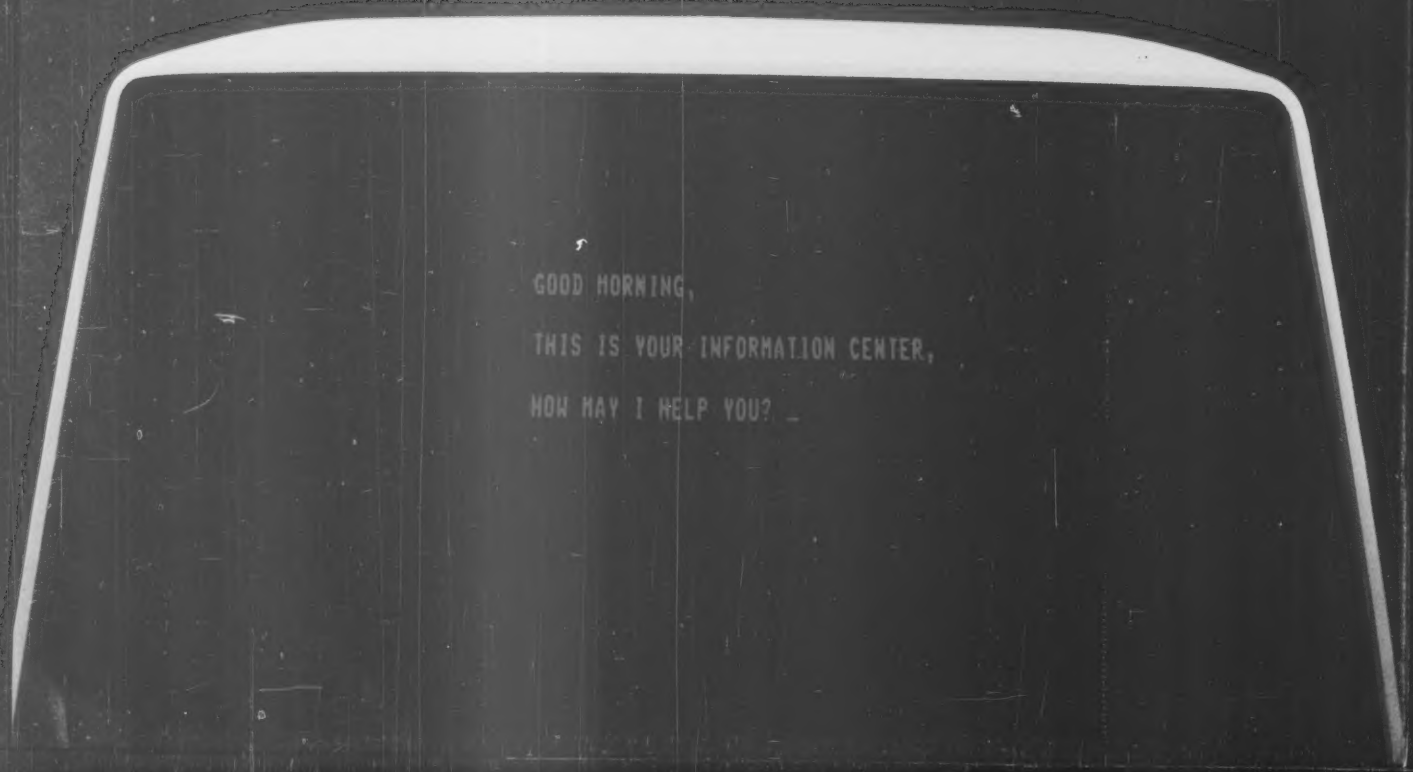

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data base and I wanted to add some information about ships (for whatever reason), I might say:

"The Titanic is 500 feet long."

Straight Talk doesn't understand "Titanic" automatically, but it allows me to define it as being a "ship," and it remembers that definition. Subsequently, I could tell Straight Talk that "Sue is the captain of the Titanic," and it would remember this also. With these additional facts, I could now get the answer to a question such as:

"What is the salary of the manager of the captain of the Titanic?"

Straight Talk does not directly access data bases other than its own. However, it is likely that routines will be available to convert other standard files to the Straight Talk format.

Not only is Straight Talk scheduled to be available through Dictaphone, Symantec may begin selling it late this year for the IBM Personal Computer and other micros.

Until now, Cognitive Systems, Inc. has used their base natural English technology to produce customized query system front ends for Explorer, a geological data base; Marketeer, the Access market analysis system of Dialogue, Inc.; and Broker, Standard & Poor's Compustat data base. These systems run on a Digital Equipment Corp. Decsystem 20 and are used by customers on a time-sharing basis.

More recently, Cognitive Systems has focused on developing a customized natural English front end to be used by time-sharing services, as well as on developing expert adviser systems. Some adviser systems already exist, but their main use at this time is for demonstration.

TAD, the Cognitive Systems Tax Assistant, steps a user through a very flexible dialogue whose ultimate goal is to fill out a federal income tax form. TAD understands federal tax regulations, keeps tax tables and is able to suggest and explore alternative approaches such as income averaging.

A second adviser system is the Automatic Will Writer and Estate Planner. Like TAD, the Will Writer has the legalities of wills and estates built into its knowledge base and is able to guide a user simply through preparation of what can be a very complex document. In addition to gathering specific data, the Will Writer is able to digress into explanations of such things as trusts. If its built-in knowledge is exceeded, the Will Writer suggests that the user consult an attorney for further explanation.

There are many such expert advisers that would be useful in the office for professionals, accountants, insurance people and others. For now, Cognitive Systems is focusing on development of a commercial adviser system for travel agents.

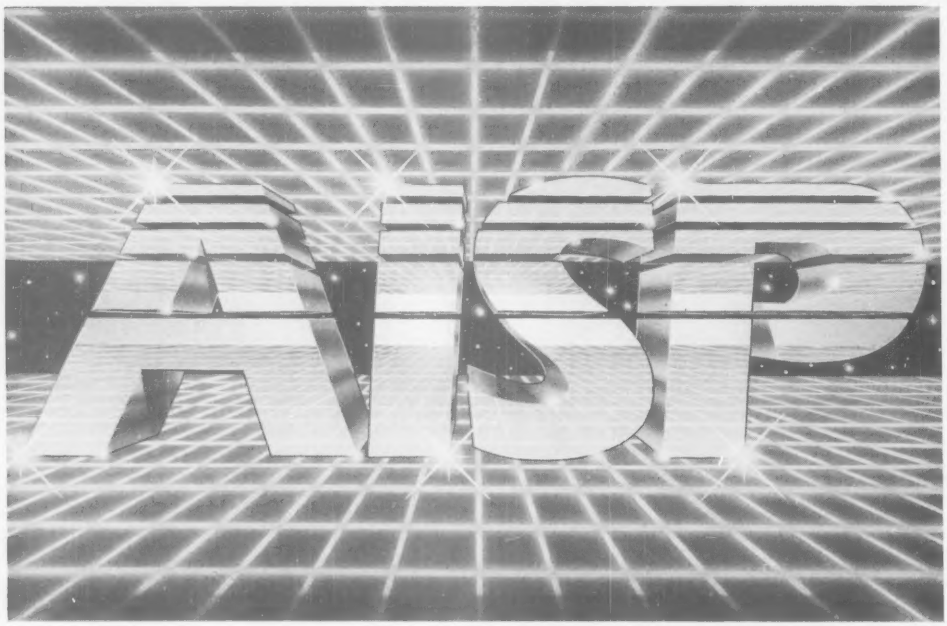
"AI is now officially out of the laboratory and is being applied to real-world problems."

The systems described here are either available now or will be available in the near future. But they are just the beginning of a vast array of fifth-generation software that will be appearing in the marketplace in the next decade.

These current systems are certain to be enhanced as new AI techniques become available, and new AI systems will have capabilities that are now only at the threshhold of possibility. In particular, enhancements are likely to be seen as increased emergence of knowledge-based expert systems as advisers, as tutors and even as stand-alone decision makers. The next series of AI offerings are likely to be smarter, particularly in their ability to understand complex situations and to learn from their experience.

AI is now officially out of the laboratory and is being applied to real-world problems in more than 100 companies around the world. The emergence of AI technology as a commodity brings with it a responsibility for office workers at all levels to become aware of the potential uses of AI and the ways it is likely to have an impact on their jobs and their companies **OA**

Keller is president of Renaissance Consulting, a training, education and support service firm in Harvard, Mass., which assists companies in applying artificial intelligence.



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The World According To Cullinet

By Glenn Rifkin

It was a bleak day for Cullinane Corp. when, in the late 1960s, it had an $8,500 payroll due and was down to its last $500 in the bank. A check, just covering the payroll, arrived that day, recalled John Cullinane, founder and chairman, and it saved the young software firm from bankruptcy. Fourteen years and two name changes later, Cullinet Software, Inc. not only survived, but has emerged as the second largest software vendor in the industry. In fact, Cullinet is simply "the most successful software company in history," according to the company's unabashed impresario, Cullinane.

Though some software industry watchers might take exception to Cullinane's boast, Cullinet does hold an impressive track record in a field littered with casualties. Hundreds of small start-up ventures have gotten lost in the software shuffle during the last two decades, while only a select few have managed to achieve varying degrees of success in the highly competitive software arena.

If Cullinet has raised some eyebrows with its fast-paced drive to the top, it has also begun to suffer the slings and arrows that traditionally plague the king of the hill. As it loudly blares its intention to "usher in the age of software," Cullinet has come under varied criticism from industry analysts for promising what it might not be able to deliver or overselling what it is able to deliver.

On April 19, after months of fanfare, Cullinet introduced a series of new offerings geared to providing an integrated data base link between mainframes and micros. The announcement left many industry watchers scratching their heads wondering what all the excitement was about. Analysts agreed the products have the potential to be significant, but felt it was difficult to determine much from the announcements. Indeed, the company admitted that the announced products — an Information Database, a relational data base management system (IDMS/R) and integrated personal computer software — would not even be beta-tested until December and probably would not be available until next spring. It was hard, analysts felt, for the user community to start the party when the gifts wouldn't arrive for a year.

"I don't know if they're ushering in a new age," stated Frank Gens, senior analyst with the Yankee Group. "They're targeting the end user. I think the products are more a statement of Cullinet's strategy and direction for the foreseeable future."

The new product offerings as well as the company's recent name change from Cullinane Database Systems indicate Cullinet has realized it must expand beyond the data base management system (DBMS) marketplace. Along with its new products, the firm announced a joint development program with Apple Computer, Inc. to provide an interface between Apple's Lisa and Cullinet's Information Database as the link to the IBM mainframe. This bringing together of the mainframe and microcomputer environments portends that Cullinet is gearing up for an attack on the office automation market.

Cullinane agrees the network concept leads his company in the OA direction. As a specialist in maintaining mainframe data bases, Cullinet is in a perfect position to provide end users with access to mainframe data from wherever they may be in the office environment, he pointed out. "A lot of the software we introduced on April 19 is going to make possible a lot of things people have only been talking about."

Whether the products meet the promise remains to be seen, but Cullinet's president, Robert Goldman, is confident. The company wanted to get all its plans out in the marketplace at once instead of letting each product "trickle out," Goldman explained. He believes the industry will not be disappointed when the products are available. "You can look at our track record on what we've delivered."

Despite some of the grumbling, Cullinet watchers know better than to jump to any quick conclusions about this software giant. If past is prologue, Cullinet's new products, backed by a slick and aggressive marketing program, will probably make a significant mark on the industry. Ann Morley, manager of software and computer services research for the Framingham, Mass.-based International Data Corp. (IDC), believes that of all the software houses, Cullinet is the most like IBM in its ability to market its products with a "great deal of professionalism. They really understand advertising, selling and marketing."

Cullinet's success is, in financial terms, stunning. Just 15 years old, the company has grown to 800 employees worldwide and expects to exceed $75 million in revenues for 1983. Their growth rate is being held to 50% — "We could be at 67% if we wanted to," according to Cullinane — with 26 straight quarters of perfect sales curves and profit margins. In 1982 they became the first software company to be listed on the New York Stock Exchange (NYSE), and the company has a $500 million valuation. A recent financial report by Paine Webber Mitchell Hutchins, Inc. stated, "The dismal economy notwithstanding, Cullinet continues to roll on."

"Our strength," Cullinane suggested, "is that we have no weaknesses."

The picture, of course, was not always so rosy — even according to Cullinane. After shifting around from Arthur D. Little, Inc. to numerous computer consulting firms in the '60s, Cullinane finally felt confident enough to form his own software company in 1968. Never a wallflower, he dubbed it Cullinane Corp. and tried to market a report generator named Culprit. At the time, Cullinane was fighting a "not invented here" syndrome in which off-the-shelf software was considered taboo in the industry. If the product wasn't invented in-house, companies believed, it couldn't possibly work.

With no resources and no time, Cullinane's company (which consisted of five employees) was fast on its way out of business. EDP Auditor, a variation of Culprit, was developed in-house and stalled Cullinane's demise until B.F.Goodrich Co. chose the struggling firm to market and support its Codasyl-compliant DBMS project in 1973. Shortly thereafter, the company acquired the product, IDMS, from Goodrich. The entrance into the DBMS arena, which is still Cullinet's niche market, was the make-or-break moment, according to Cullinane.

"Our strength is that we have no weaknesses."

— John Cullinane

"That was the foundation product that everything else could be built around," he pointed out. "It gave us a chance to grow."

With IDMS catching on quickly as one of the leading integrated data base management systems, Cullinane decided to "take the plunge" and pour resources and people into expansion and growth. Cullinane Corp. set about acquiring and developing a number of related products to enhance its position in the DBMS market. In 1975, the Integrated Data Dictionary was introduced, followed quickly by a variety of products such as IDMS Database; IDMS Communications; On-Line English (acquired from Artificial Intelligence Corp. of Waltham, Mass); Escape, a facility for migrating DL/1 and Total applications to IDMS; and several integrated applications packages including General Ledger (acquired from McCormack and Dodge Corp.) and the Manufacturing System (from Rath and Strong, Inc.)

In 1980, having achieved a solid identity within the data base management field, the company changed its name to Cullinane Database Systems, Inc. In 1981, calling it "a major breakthrough in software integration for the '80s," the company introduced its IDMS-82 concept, which included the

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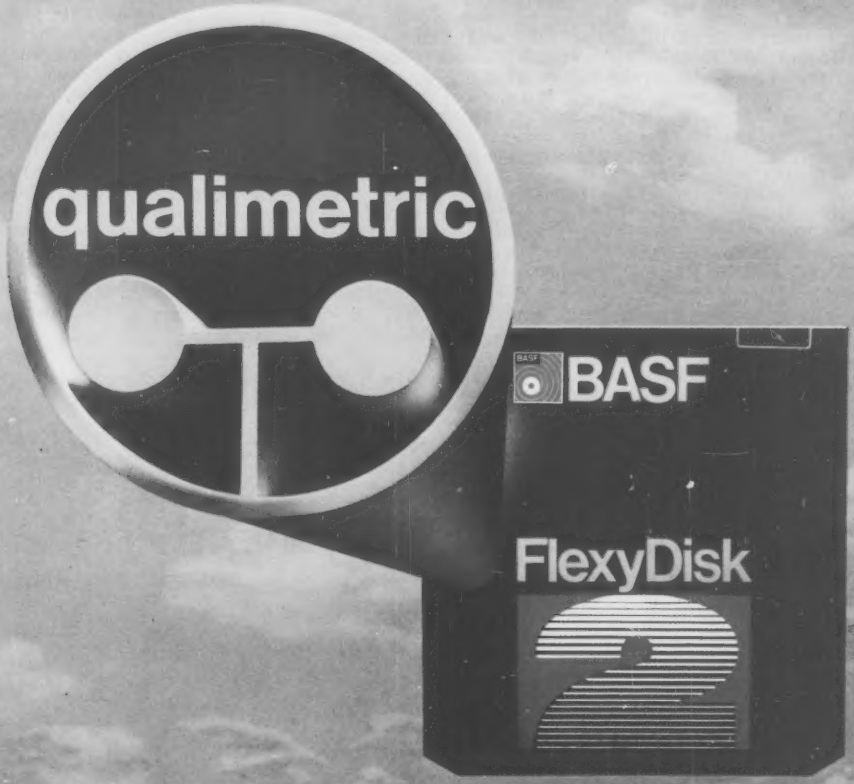

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popular ADS On-Line system as well as a relational view facility for a production data base called the Logical Record Facility.

After becoming the first software products company on the NYSE, the aggressive vendor made its move toward the end-user market by acquiring Computer Pictures Corp., a personal computer software manufacturer. With a fully integrated data base, applications software and decision-support software, Cullinane decided a new name would again be appropriate. In early 1983, Cullinane Database Systems became Cullinet Software, Inc.

"We like to have a name that is descriptive of what we do at a particular point in time," explained Cullinane about the revolving titles. "Our first two names tended to be limited to data base technology as our only sphere of interest. Cullinet Software encompasses a network concept from the desktop to the mainframe. It's an inclusive name, so we won't have to change it as we expand."

Cullinane also wanted to shift the identity away from himself and give visibility to the management team of Goldman and Frank Chisolm, the executive vice-president, who have been running the day-to-day operations.

Cullinet is convinced hardware is no longer the fuel that fires the computer industry. A bold advertising campaign signals this as the "software age" and claims Cullinet is the "inarguable choice." Such successful competitors as Management Science America, Inc., the largest software vendor; Cincom Systems, Inc.; Applied Data Research, Inc. (ADR); and Informatics, Inc., with whom Cullinet shared the number two spot in packaged software revenues in 1982, might be more than willing to argue, however, about who controls the $5 billion packaged software industry.

Analysts believe Cullinet's newest offerings need to be everything it claims in order for the company to maintain its position as an innovative supplier of data-base products. The IDMS product, the company's cornerstone, is seen by some as an aging product headed toward possible obsolescence. That weakness could certainly cut into Cullinet's drive to the top. Analysts also feel that Cullinet's competitors are working toward establishing similar capabilities in the integrated DBMS market and will provide a stern test for Cullinet, with its high operating margins.

"If they can't be seen as a leading-edge supplier of data base products," said IDC's Morley, "they could have problems."

Cullinet, of course, has no intention of letting that happen. Cullinane believes his company's success has always come from being user-driven — a concept he credits himself with introducing to the software industry. He said they will continue to practice that philosophy, which makes their entry in the OA market that much easier.

"We listen to our users carefully and try to build to meet their requirements," Cullinane said. The software industry has traditionally been "backroom-driven" and inundated with products developed first and applied later. "By listening to knowledgeable users and being responsive to their needs, you wind up coming from last place in 1973 to a position of eminence," he stated. In fact, Cullinet's success has attracted a great deal of attention. Among their major customers are B.F. Goodrich Co., General Electric-AEG, Harvard University, Shearson American Express, United Airlines and Bendix Industrial Group. "[Cullinet has] an impeccable financial record," Morley stated. "They are well managed, well organized and well run. There is credence to the argument that they are the most successful software products vendor."

The user-driven philosophy was at the core of Cullinet's latest offerings. The biggest problem in the industry over the past 20 years has been that each of the thousands of software vendors in the market offer a single product to one vertical market, Goldman said. The user has been forced to buy all these different pieces, finds that none of it works together and ends up with a data base that won't work with the software. The user is stuck integrating the pieces.

"Presidents of companies come here for demonstrations. When we tell them that story, they look to their DP person next to them and ask, 'Is that true?' It comes as a real surprise to non-DP people that it is that way," Goldman observed. And as end users become increasingly involved through OA, they will be asking that question more often.

Cullinet is unique, according to Goldman, in that it offers complete integration as the solution. But industry analysts feel that several DBMS software vendors, including Cincom and ADR, offer similar solutions. According to the Yankee Group's Gens, DBMS ven-

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dors have been heading in that direction for two years.

The new products that Cullinet believes will put them out front in the software market are the Information Database and the IDMS/R, a relational evolution of IDMS. The Information Database, a link between the personal computer and the production data base, is an implementation of the information center concept, according to Goldman. It reportedly allows the personal computer user to get at a summary of information rather than having to go through every single detail found in the production data base. The data can be accessed using a variety of nonprocedural, menu-driven tools.

"Despite the rush toward end-user solutions, Cullinane is quick to point out the company's continued commitment to the mainframe world that has been its lifeblood."

The IDMS/R, Cullinet claims, is the first commercially available DBMS to combine the full advantages of both network and relational DBMS architectures in a single system. Industry analysts felt it was not clear from the announcement whether the system was a true relational DBMS. Because the product is still being developed, it will be impossible for the final verdict to come in until it is beta-tested. Goldman, however, feels that IDMS/R will be what it claims.

In Goldman's view, the basic difference between a relational system and a network system is that in a network system, the relationships of data are predefined, while in a relational system, the relationships are determined during processing. The relational side of IDMS/R will be exactly that, he said. "Does that make it a relational data base? That's where it gets fuzzy. There is no absolute definition of a relational data base. By what is considered a relational system, this is as relational as all of them. It is truly a relational data base."

In closing the gap between the mainframe and micro environments, Cullinet also introduced its Personal Computer System, an integrated set of management and decision-support tools that run on the IBM Personal Computer. The problem has been, Goldman said, that when personal computers are hooked to the mainframe "they have nothing to talk to." Even if the personal computer user can get to the mainframe, he probably won't know the query languages or whatever is necessary to communicate. The Personal Computer System will solve that problem, Cullinet believes, because the integration between the information data base and the personal computer will make for easy access to data being used to drive production applications. It will, the company claims, truly integrate the personal computer into the mainframe environment rather than keep it in a stand-alone mode.

Despite the rush toward end-user solutions, Cullinane is quick to point out the company's continued commitment to the mainframe world that has been its lifeblood. Over the past few years, a whole group within the industry has been concerned only with the end user; they would like to forget that the very life of the company is being sustained by the mainframe, according to Cullinane. "You can't forget what's happened before. You need to walk down that road together."

For Cullinet, the next six months will be a critical waiting period as the industry anticipates the arrival of its new products. If successful, with the company's current growth pattern, it is only a matter of time before Cullinet takes over as the largest DBMS software products manufacturer. Cullinane takes a pragmatic view of Cullinet's position.

"I never expected to be at this particular spot when I started out," he recalled. "Survival was the issue, not prosperity. It's rosy now, but it isn't easy. You have to do it right day after day. That's our forte, though. That's why we're such a difficult company to compete with. We're relentless."

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Rifkin is a staff writer for Computerworld OA.

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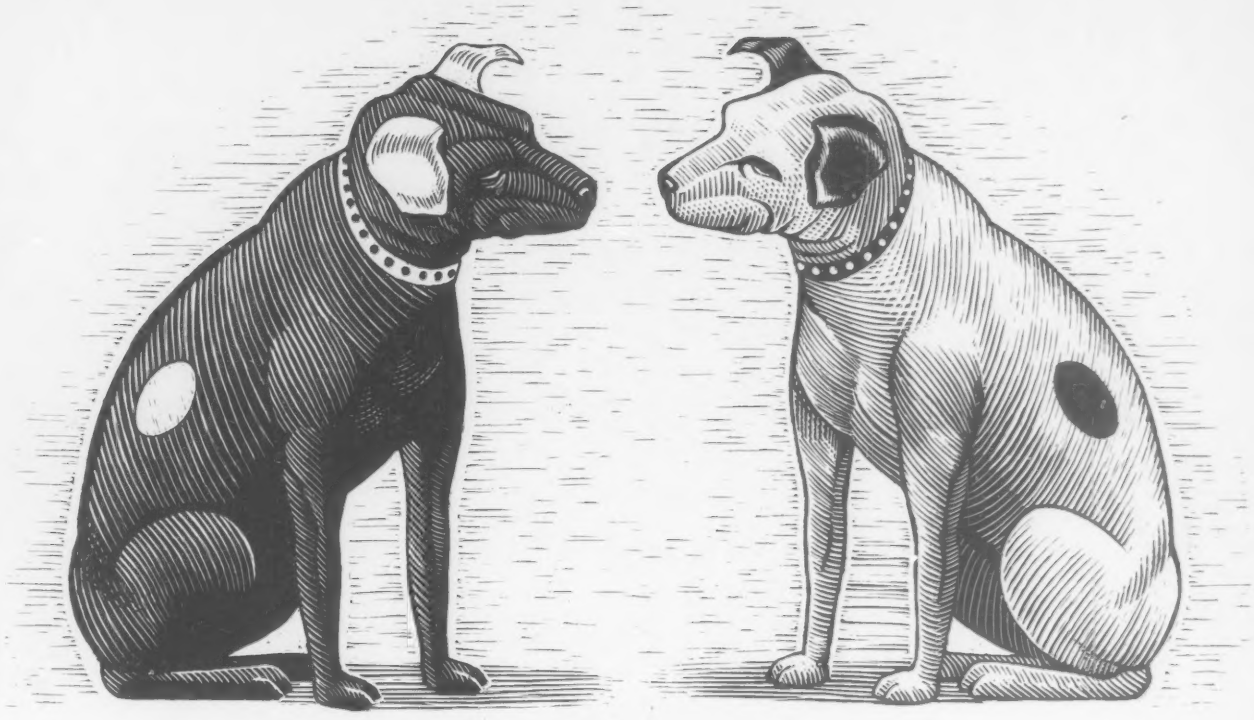

ILLUSTRATION BY DOUG SMITH

Protocol Conversion At RCA

RCA is coordinating emulators and simulators with its current computer systems to form its OA strategy.

By Robert F. Reisner and David H. Bennis

RCA Corp., like most other large corporations, consists of a very diverse community of users. To best meet the needs of these users, RCA has begun a voluntary computer service supply cooperative in its Corporate Information Systems and Services organization. This cooperative, known as RCA Computer Services, provides a wide range of IBM-based computing.

RCA Computer Services has grown from a single IBM 370/145 computer in 1975 to today's environment, comprising multiple IBM 3081s, 3033, 3032 and 370/168 computers. Although significant traditional batch administrative computing occurs, over half the work load is on-line, terminal-based computing. More than 4,000 RCA employees use the IBM VM/CMS and TSO timesharing systems; another 750 terminals are devoted to RCA's IBM CICS-based business transaction processing environment. A conservative estimate places the growth of these on-line environments in excess of 30% annually.

When we reviewed our past growth and, more important, our projections for the future, we decided it was time for a new strategy. We wanted to be able to exert more control over the rate of cost increase and to improve computer access flexibility. To meet these needs, the Computer Services organization devised the following three-part computer supply strategy:

- The evolution of the existing centralized shared facility into a form better suited for today's needs. Emphasis was to be placed on sharing expensive high-function software and services as well as continuing administrative batch processing.
- Establishing complementary small, local computing facilities located at RCA operating units and designed to provide low-cost on-line computing to the RCA professional community.
- Setting up a communications

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strategy designed to tie these and other facilities together.

An advanced communications environment connects the shared superservice center and the local computer facilities. Through it, an individual user at a facility can make use of his local computer, the central IBM service center or any other computer installed in his facility. In addition, a given user, in combination with the central IBM center, can access the numerous data bases and specialized programs that exist in non-RCA commercial computer service organizations.

This communications environment includes local-area network technologies for computer and terminal communications within a facility and very high-speed dedicated computer-to-computer communications between RCA facilities. Also included are very low-cost multifunction terminals capable of being an IBM 3270 on one hand and a Digital Equipment Corp. VT100 on the other. The communications environment relies upon the use of hardware and software terminal simulators/emulators to make dumb inexpensive terminals outperform standard vendor terminals.

In this environment, a dumb Ascii terminal is connected to a computer via a local-area network at 9,600 bit/sec. This high-speed access via the local-area network combined with the emulators or simulators provides IBM 3270-type terminal capabilities to the user community.

The use of protocol emulators/simulators was attractive in this environment because:

- Industry sources and our own observations indicated that one of every two white-collar workers will have a terminal or computing device on his desk by 1990. In a shorter period, we expect 100% of our engineers to have terminals or personal computers on their desks.
- At RCA, more people use non-IBM than IBM computers. This means that many users perceive the IBM environment as a second system or that a non-IBM system is used to supplement IBM system use.

The RCA terminal population is already quite large, and projections indicate a very sizable increase will occur in this number. With a terminal population of thousands — or even fewer — RCA could have significant savings if it could use dumb Ascii terminals in place of smart IBM 3270 terminals.

The cost of a dumb Ascii terminal can be as little as 25% of the cost of an IBM 3270 terminal. The enhanced dumb terminal — fixed to perform like the smart IBM 3270 — usually will cost less than half the price of the IBM 3270. Further, most of the non-IBM minicomputers in RCA are accessed via the dumb Ascii terminal and do not permit access by the smart IBM 3270 terminal.

Part of our service strategy was to find an economical way to let a dumb Ascii terminal work as a smart IBM 3270; we have installed hardware devices and software programs that achieve this objective. Today, RCA is saving money through the use of Ascii devices.

In addition, using these Ascii devices has allowed the RCA community to access the widest possible spectrum of computing — IBM, minicomputers (especially DEC) and outside commercial services.

To round out the environment, software was installed to meet a less obvious objective — to permit IBM 3270 terminals to look like dumb Ascii devices so users could access minicomputer systems and commercial services.

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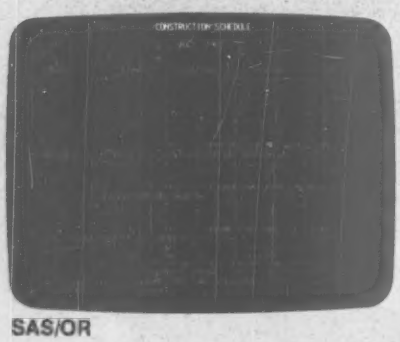

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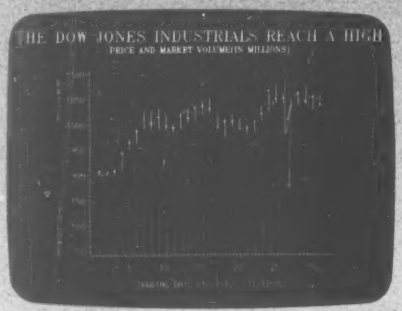

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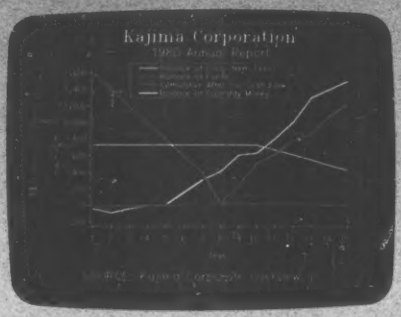

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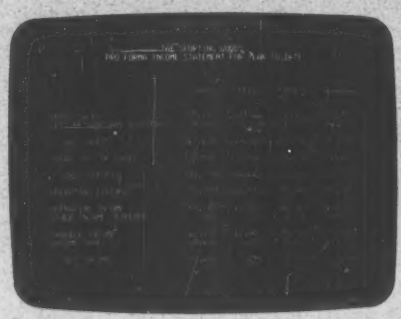

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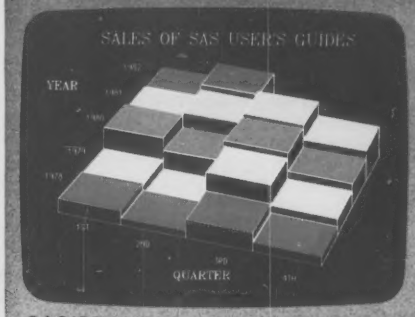

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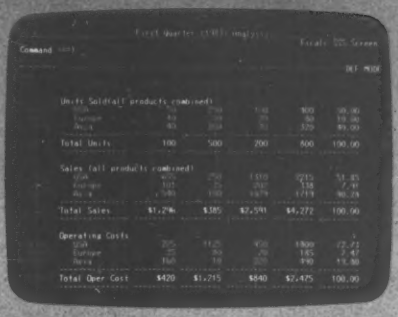

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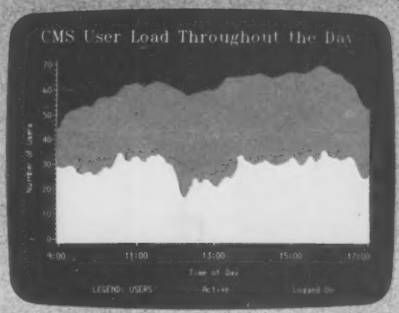

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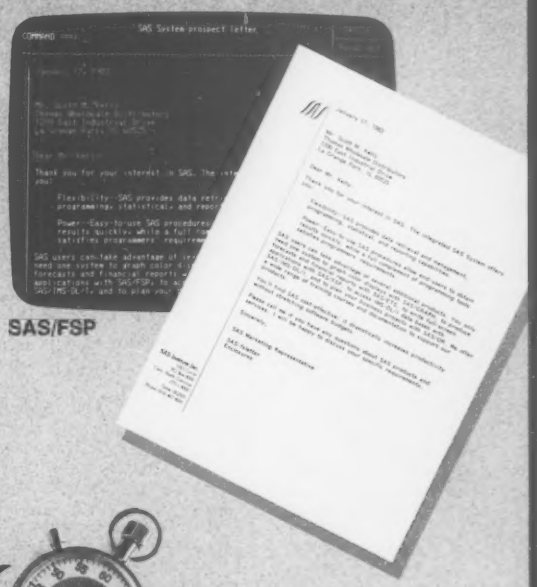

SAS/FSP

At the beginning of 1982, we began a formal evaluation of 3270 emulators. The following attributes were considered in the evaluation:

- The number of terminals supported per device and the increment of expansion available from the base-level model. We were looking for a family of units or a unit flexible enough in size to meet our specific needs at individual remote sites.
- Type of terminal supported. The emulators had to support a broad range of terminals because we do not have strict control over the types of terminals our users purchase.
- Type of controller emulated. Was it an IBM 3271 or IBM 3274? For our initial use, an IBM 3271 would be satisfactory. However, emulation of the 3274 would be necessary as we moved into Systems Network Architecture and wanted to expand emulation to 3278 Model 5 (132-character lines) and 3279-type (color graphics) terminals.
- Quality of emulation and ease of use. How well were the functions emulated on different types of terminals? How easy was it to use the keyboard? Consistency of mapping throughout different keyboards was also an important consideration.
- Maintenance and support.
- Cost.

We compared several vendors' products and requested in-house demonstrations. After the initial evaluation, we limited our choice to two units. Each was brought in for a one-month test period; at the end of that time, the Datastream T7 unit was chosen as the 3270 emulator that would best fit our needs.

The Datastream was chosen because of the number of terminal types supported and the quality of the emulation. This was especially true in the case of the DEC VT100 — the predominant Ascii CRT within the corporation. In the area of maintenance, both vendors tested seemed about the same. In support, however, Datastream was extremely helpful and responsive to any questions we had. We liked one aspect of the Datastream offering: Its firmware is cassette loaded and does not reside on programmable read-only memory. At first glance, the use of cassettes for loading seems rather antiquated and a possible disadvantage. However, the capabilities provided by cassette allow any tailoring or customizing of the particular unit to be stored on the load tape. Therefore, any time the system is reloaded, that tailoring is still in effect. Whenever a new release of the Datastream firmware is issued, we can tailor for each of our remote units locally. The tapes, which are easily installed, can then be distributed to end users. Also, when users acquire new terminals, new tapes can be ordered and installed more easily than new Proms.

Currently, six Datastream 3270 emulators are installed at RCA — two 12-port units at our central site, and two 16-port units and two 8-port units at user sites. Our experience has been one of excellent user acceptance and reliability. These devices are working today on local-area networks as part of the previously described communications support strategy.

Also installed at our central site is Aztek Computing, Inc.'s SIM3278, a 3270-simulator software program that runs under the IBM VM/370 operating system. The functions SIM3278 provides to the end user are essentially the same as those of the Datastream, but its access is limited to the VM/370 system. The Datastream emulators access all systems — VM, TSO or CICS. The Aztek Simulator supports access of over 34 different types of Ascii terminals.

Choosing the simulator was less involved than choosing the emulators for two reasons — there were no other products to compare it with, and its very low cost lessened the risks.

We brought the simulator into our environment for an extended operational test, a 60-day period using many types of Ascii terminals. Except for the generally poor quality of user documentation (which has since been somewhat improved), the simulator worked very well. An unexpected side benefit of the test was the discovery of the support of the IBM Personal Computer as a 3270 terminal device (still our only support of this device as an IBM 3270 terminal).

Another useful discovery we made was that a single user at a terminal can run multiple VM time-sharing sessions, moving from one session to another via a single command. For example, a user can execute electronic mail at the same time he is running an application program — a very valuable productivity feature.

The simulator was easily installed without any modification to our operating system. User access involved two quick additional user commands at the terminal. Currently, the simulator is in-

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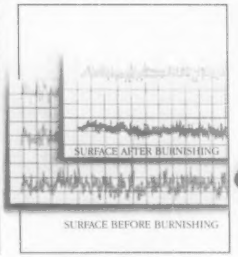

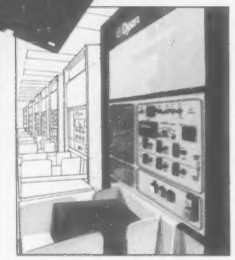

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stalled as a piece of the standard time-sharing operating environment. Because of the functionality and stability of this environment, two departments have exchanged more than 25 expensive IBM 3270s for less expensive Ascii terminals.

Each product had advantages and disadvantages. In a direct comparison, however, we found the hardware emulator (the Datastream) superior to the software simulator (the SIM3278) for our purposes.

Each product had strengths and weaknesses. The strongest feature of simulation was cost; the licensing fee for a SIM3278 is $5,000. The number of terminals supported is limited by the VM operating system; it is possible to support more than 255 terminals through SIM3278. Among the disadvantages of the SIM3278 is its inability to provide consistent keyboard mapping through different types of terminals. It is also limited in functionality within certain types of terminals; for example, the Lear Seigler ADM-3 does not allow character insertion or deletion. In addition, a simulation package requires end users to dial in directly to the host site. Some economies are lost because of the cost of telecommunications and the inability to concentrate communications.

Cost is the primary disadvantage of the Datastream in comparison with the Aztek — the units are considerably more expensive than the Aztek. At times, however, other features outweigh this disadvantage. The Datastream offers full-function 3270 emulation on all terminals and has consistent keyboard mapping throughout different types of terminals. This is useful when a site has a large number of diverse terminals shared by many individuals.

Another advantage is in the area of telecommunications costs. When emulators are located at user sites, the user needs only to make a local or in-house call to the unit, not a long-distance call to the central site. Communications from the unit to the central site takes place via a leased line, which is less expensive than the many dial calls required by the simulator.

The Datastream performs a nearly complete emulation, supporting 24 programmable function keys, highlighting and character insert and delete. For many terminals, the Aztek does not support a full set of function keys, highlighting or character insertion/deletion. Character insertion/deletion is an important item in 3270 functionality; without it, many benefits of full-screen functions are reduced.

Nevertheless, the Aztek is significantly faster than Datastream in response time to commands. It is also more sophisticated in screen updating — Aztek only transmits required screen changes. For medium-speed remote applications, the software simulator is well suited. Its use provides reasonable response characteristics at 1,200 bit/sec and via public switched facilities. Not having to install a leased line or expensive modems can often be a substantial savings for remote occasional use activities.

Within RCA, the Aztek simulator offers a special benefit. Being software driven with the programming code available to us, our organization can quickly implement support for a new terminal or customize support for an existing terminal to meet a specific need.

The emulator and the simulator should not be a black-and-white or apples-to-apples comparison. Each performs its basic functions well. From our standpoint, both the simulator and emulator are parts of one solution.

The benefits of the emulator are dependent upon a specific minimum number of users at a site and a certain diversity of terminals. Where these conditions are met, the emulator is the best alternative.

For small offices, occasional users, personal computer users, remote users and users local to the VM computer, the simulator is the better alternative.

Together, the Datastream emulator and the Aztek simulator can solve virtually all the access situations involving IBM 3270-type support — the simulator as the all-around utility; the emulator for specific situations or multiple systems access.

IBM 3270 terminal users have occasional need to access outside commercial data bases or non-IBM systems. The Terminal Simulation Facility (TSF), a software package from Trax, Inc. provides this capability. TSF runs on the IBM VM/CMS time-sharing system and allows a "real" IBM 3270 terminal to "dial out" to another system as an Ascii device. This dial-out can be over phone lines (public switched network), over a packet switch network (Tymnet) or over internal RCA facilities. For example, an IBM 3270 terminal user is able to access the Dow Jones News Retrieval System by executing a single command. This person can execute any command any other Ascii terminal user could enter.

This facility rounds out the terminal support environment. Any IBM terminal user and most non-IBM terminal users can access the full spectrum of IBM, non-IBM and commercial systems in an easy, economical user-friendly environment.

The use of protocol emulators and simulators is one part of an integrated RCA strategy and the provision of terminal equipment to its user community. This strategy encompasses the full range of available terminal devices. It emphasizes maximizing economies and making sure each user had the right tool for his job. IBM 3270 or plug-compatible manufacturer equivalents will continue to be the primary devices used for on-line transaction processing systems. The business teleprocessing (CICS) systems make use of the special features not easily duplicated in emulators and simulators.

On the other hand, the white-collar professional who principally uses time-sharing or decision support systems can best be served by the economical Ascii terminal. The low-cost Ascii terminal provides the necessary 3270 features (such as full screen). The time-sharing user is not characterized by continuous use of the terminal facility; rather, he can use it as a tool that enhances the work performed. Much like the telephone, it is an occasional-use device. For this reason, we can provide a lower cost device; in turn, this lower cost device lowers the threshold at which individual professional users can afford to make use of various computer facilities.

Professionals who have some requirement for IBM 3270 terminals can make use of the full range of RCA and commercial computing alternatives through software packages providing Ascii terminal simulation. These users are often professional programming people who require access to multiple IBM mainframes using different communications protocols.

This strategy ensures that individual users have the most appropriate terminal device at the least possible cost to RCA. In addition, this strategy will let RCA introduce personal computers for professionals at the most appropriate time. Because it has not tied up scarce capital in IBM 3270-type equipment and it has made do with low-cost Ascii devices, RCA will have one strong advantage in OA planning. RCA will be able to mass introduce personal computers into the professional community when those computers reach an appropriate price and offer sufficient function to offer maximum benefit to the professional community.

As widescale delivery of protocol emulator and simulator support to the RCA community proceeds, these devices will be used to provide different levels of economy or function. The software simulator will most often be used to provide the least-cost 3270 simulation for the Ascii terminal. The software-driven simulator requires no hardware between the terminal and the mainframe computer.

RCA Computer Services will broaden the use of the Datastream emulator and the Aztek software simulator currently in use. At the same time, RCA will continue to explore other types of emulators and simulators to ensure that we continue to have the appropriate mix of economy and function. The RCA environment should permit different systems to be installed over time in a nondisruptive fashion. For example, the Yale-IUP from IBM is being installed to provide 3270 support on a distributive 4300 computer using the IBM 3101 Ascii terminal device. This particular software and hardware package may not have wide general availability in RCA because of its limitations in accessing non-IBM systems alternative which saves money in certain dedicated distributed applications.

In conclusion, protocol emulators and simulators save money, but one of their best values is in the flexibility of access they provide. The intelligent use of protocol simulators and emulators will save RCA up to $1,000 per Ascii terminal installed. In the next few years, this could represent a multimillion-dollar savings.

As important as the specific savings are, there is also great value in having only one terminal on the professional's desk. That terminal allows the professional to access not only the full range of IBM systems as a full function IBM user but also the very large number of non-IBM systems installed in RCA.

The use of emulators and simulators forms an important part of RCA's terminal strategy in meeting its user needs in the 1980s. As part of an overall computing plan, this component emphasizes important economies, system connection flexibility and provision of necessary functions to users. OA

"The intelligent use of protocol simulators and emulators will save RCA up to $1,000 per Ascii terminal installed. In the next few years, this could represent a multimillion-dollar savings."

Reisner is director of financial administration and business planning and Bennis is manager of the Advanced Communications Systems at RCA Corporate Information Systems and Services.

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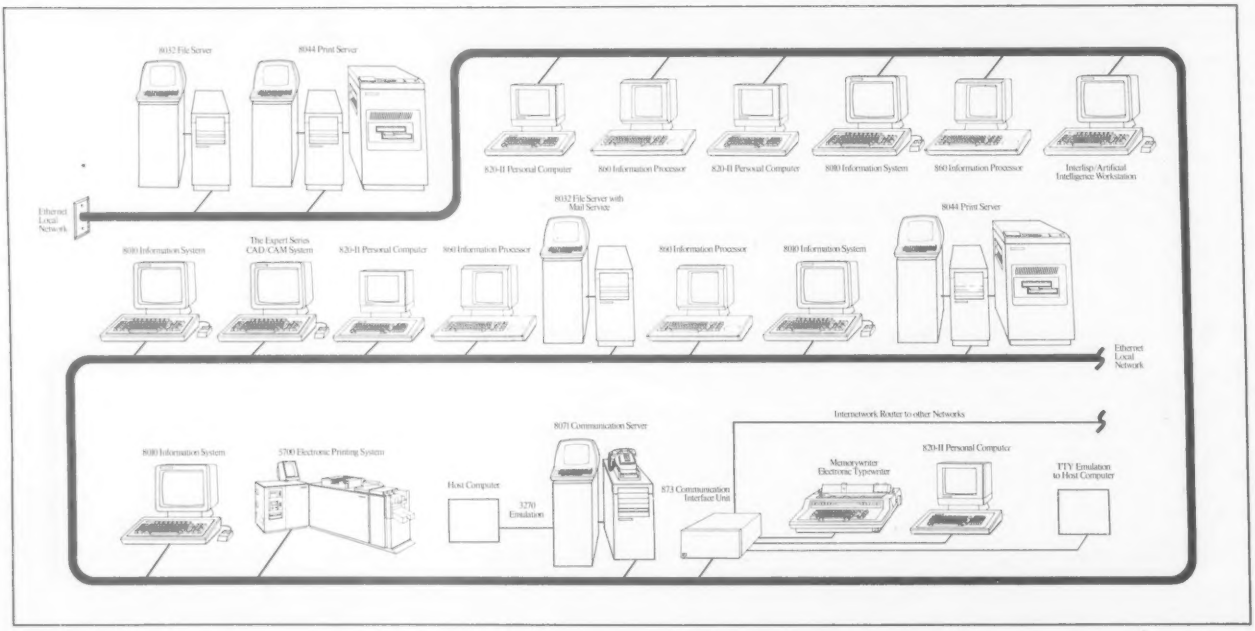

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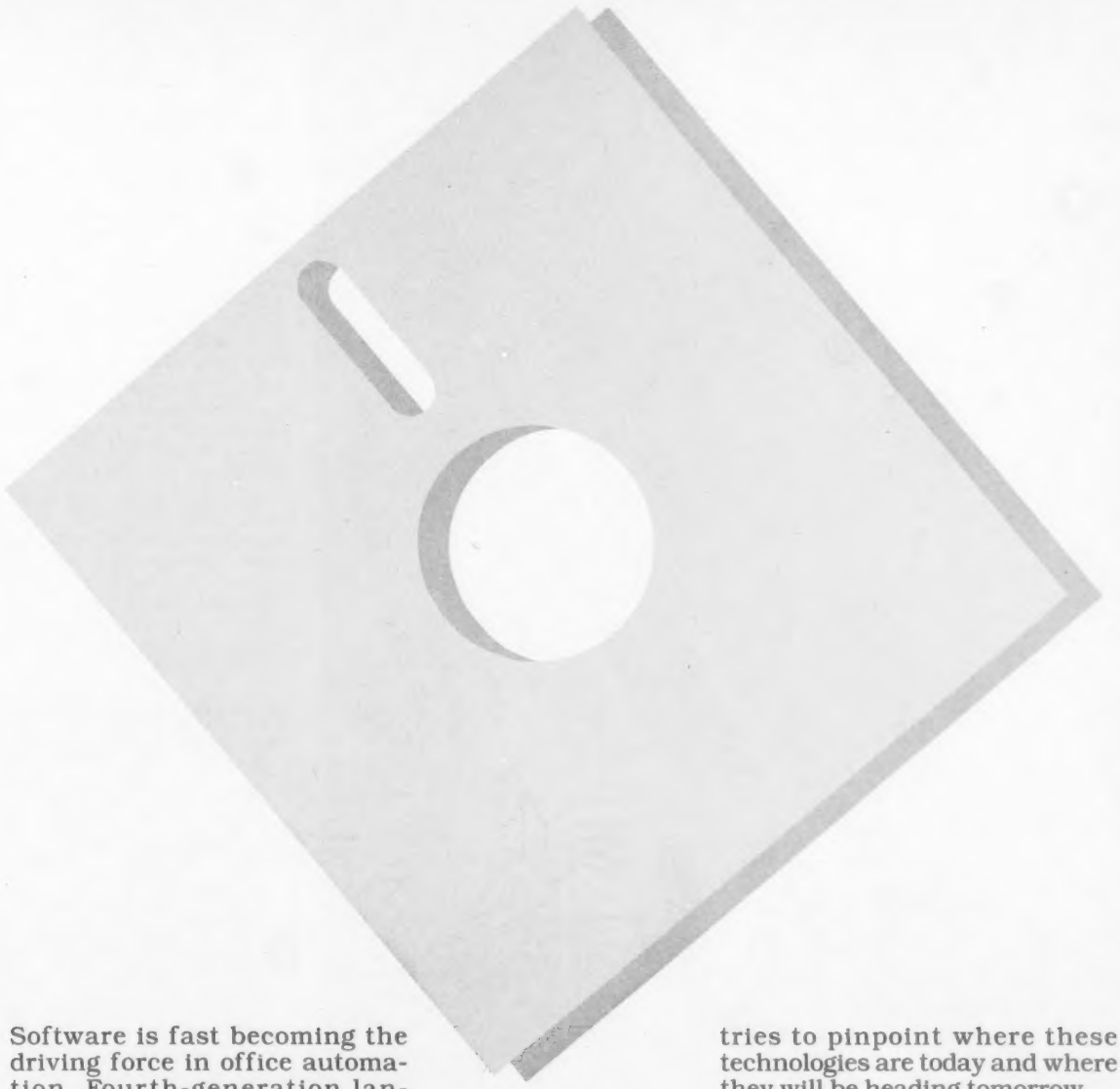

Software is fast becoming the driving force in office automation. Fourth-generation languages, artificial intelligence, data base management systems and decision support systems are all evolving rapidly and will begin to impact OA end users at an accelerated speed. "OA Focus" tries to pinpoint where these technologies are today and where they will be heading tomorrow.

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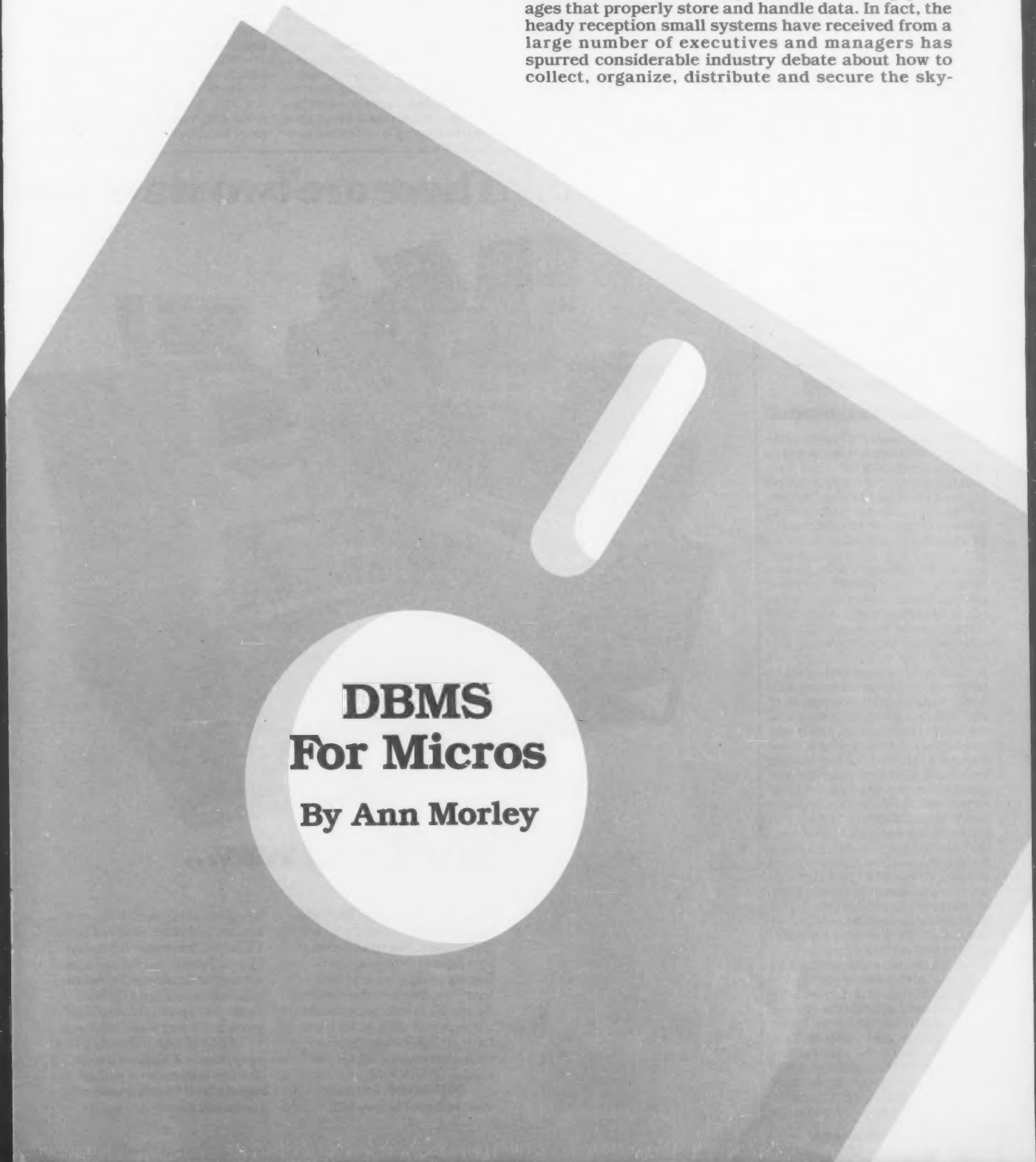

DBMS For Micros

By Ann Morley

No matter how much hype occurs over the personal computer, when you come right down to it, the application and usefulness of any personal computer depends on the software packages it supports. In addition to word processing software and spreadsheet packages, data base programs have more than proved their marketability. Increasing user demand, 16-bit machines, improved I/O capability and cheaper memory have encouraged a wide number of software entrepreneurs to develop packages that properly store and handle data. In fact, the heady reception small systems have received from a large number of executives and managers has spurred considerable industry debate about how to collect, organize, distribute and secure the sky-

rocketing amount of information stored electronically. Advances in end-user computing, especially in the office, will clearly be tied to changes in data base software.

Data base technology, or at least the concept of a data base management system (DBMS), has seduced mathematicians, computer science professors and management information systems (MIS) directors since its birth in the IBM and General Electric research laboratories in the early '60s. DBMS promises enhanced data integrity, elimination of data storage redundancy, extensive data security and flexibility of data use. This favorable image has encouraged a number of new market entrants to bless their products with the DBMS label whether they were entitled to it or not. The following definition is offered to clarify a knotty problem of determining what ought to be considered a DBMS:

"Recent improvements have made it possible for DBMS products to run on personal computers and support multiple concurrent access to the data base."

A data base refers to a collection of interrelated data files logically organized for access by multiple users. It is stored independently of user programs and represents a controlled approach for adding, updating and deleting data. A DBMS manages the access to and manipulation of an organization's integrated data base with an eye to maximizing data independence and data sharing.

DBMS have typically found their way onto mainframes and superminicomputers because of the technological limitations of implementing them on small systems. Clearly, 64K memory is not enough to support the operating system, application program and data base system memory. Recent improvements have now made it possible for DBMS products to run on personal computers and support multiple concurrent access to the data base. In fact, International Data Corp. (IDC), a Framingham, Mass.-based research firm, projects that in 1983, micro-based DBMS program sales will top $4 million and by year-end 1984 will grow to $20 million.

So where do companies like Ashton-Tate, Stoneware Microcomputer Products, Inc., and Software Publishing Corp. on the one hand, and firms like Lotus Development Corp. and Context Management Systems, Inc. on the other, fit into the DBMS picture? All these software houses have successfully marketed data management packages, although the two groups offer different kinds of capabilities. The developers of Context MBA and Lotus Development's 1-2-3 have integrated a series of applications into their spreadsheets, while the vendors of the Ashton-Tate Dbase II, DB/Master and Software Publishing's PFS have turned their attention to expanding program inquiry facilities and the like.

Enhancements notwithstanding, these packages are single-system applications that do not yet belong in the DBMS domain. Many have files that are simple lists of records, sorted on declared keys — known to technical wizards as the indexed sequential access method (Isam) — which are maintained by a list of pointers to the records in the file. The pointers in turn are ordered according to a desired sort. Consequently, the revenues of these suppliers have not shown up in the DBMS count made by IDC.

Having said this, I want to highlight two points. The first is the satisfaction many personal computer users have with the data management programs they are currently running. The second is the tremendous opportunity and change that will occur in the design, management and implementation of files and data bases in the next few years as the industry adjusts to the increasing data resources required by more sophisticated users. A number of new products coming into the marketplace exemplify these developments:

- The announcement of micro-based DBMS packages by companies that have traditionally targeted the mainframe or minicomputer marketplace with similar products.
- The development of links between personal computers and DBMS software running on very large computers.
- The design of dedicated operating systems for performing DBMS functions.
- The possibility of hooking a number of personal computers to data base machines.
- The delivery of viable relational data base management systems on small systems, and the

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increasing resemblance of micro-based DBMS software to its mainframe counterpart.

• The continued integration of a stable of end-user access and manipulation tools to enhance and enlarge the capabilities of the data base management system.

Mainframe/minicomputer entrants: In the past several months, a couple of software houses known in the industry for installing DBMS packages on large systems have turned their attention to the 16-bit marketplace. Oracle Corp., for instance, recently announced that Oracle, its relational DBMS, will run on the Motorola 68000 under the Unix operating system. Texas Instruments, Inc. subsequently indicated its new TI Professional Computer will support Oracle as well. Moreover, Callan Data Systems, Inc. has indicated that it has a microcomputer that runs Microingres, a DBMS package usually found on Digital Equipment Corp.'s VAX line. The suppliers of the non-procedural DBMS-based programs were not to be outdone: Tominy, Inc. announced that its product, Data Base-Plus, is going to be adapted for the IBM Personal Computer. Not surprisingly, the cost of all this software tends to be significantly higher than the prices charged the Dbase II or 1-2-3 user.

Micro/mainframe links: The large independent packaged software vendors have recently released a spate of announcements concerning the development and licensing of programs that allow personal computer users to download selected files for use at the end user's location. McCormack and Dodge Corp., Comshare, Inc., Execucom Systems Corp., Informatics, Inc. and a host of others have introduced packages.

DBMS vendors have started to unveil their strategies: Intel/MRI and Cullinet Software, Inc. in fact, have announced products to present to their clientele. Intel, for example, has integrated its technical expertise in microprocessors with its System 2000 software to produce two products: the Database Information System (Idis) and a data base assist processor based on the Fast-3805 semiconductor disk. The former is a multiuser 8086-based micro designed to let users specify and summon mainframe data for local processing under Microsoft Corp.'s Xenix operating system. The Cullinet Information Database facility is a series of files of summarized data culled from the production data base or external sources like Dow Jones. The files are accessible to users from their personal computers, in this case either the IBM Personal Computer or Apple Computer, Inc.'s Lisa. The information data base software resides and runs on an organization's mainframe or on a separate system dedicated to the data base's operations.

Clearly, these developments are targeted at the MIS executive who must make organizational decisions about the distribution and coherent application of personal computers in his company. His decision can impact the kind of data made available to end users as well as affect the kind of applications subsequently channelled into his department.

"These developments target the MIS executive who must decide about distribution and coherent application of personal computers in his company."

DBMS functional operating systems. Marketing managers for IBM's System/38 and Microdata's Sequel have consistently touted the performance benefits and integrity that accrue from designing DBMS facilities into the operating system. Although neither vendor has developed a system for the personal computer, one is available on the marketplace. Pick Computer Works, Inc. provides its Pick operating system to hardware manufacturers and OEMs, and it is available on a variety of minicomputers and microcomputers. Increased performance has always challenged the users of data base products, and it is not surprising that this software has attracted a good deal of attention.

Data base machines. The possibilities of enhanced performance have led a number of entrepreneurs to examine the potential markets for data base machines. According to one school of thought, these boxes will end up as data base servers in local-area networks, the idea being that global data bases will be shared by all workstations in the network, with small private files maintained on the individual workstation's flexible disk.

Other projects, and these are available today, largely attempt to improve price and performance relative to mainframe software. Britton-Lee, Inc. is the most successful company in this business.

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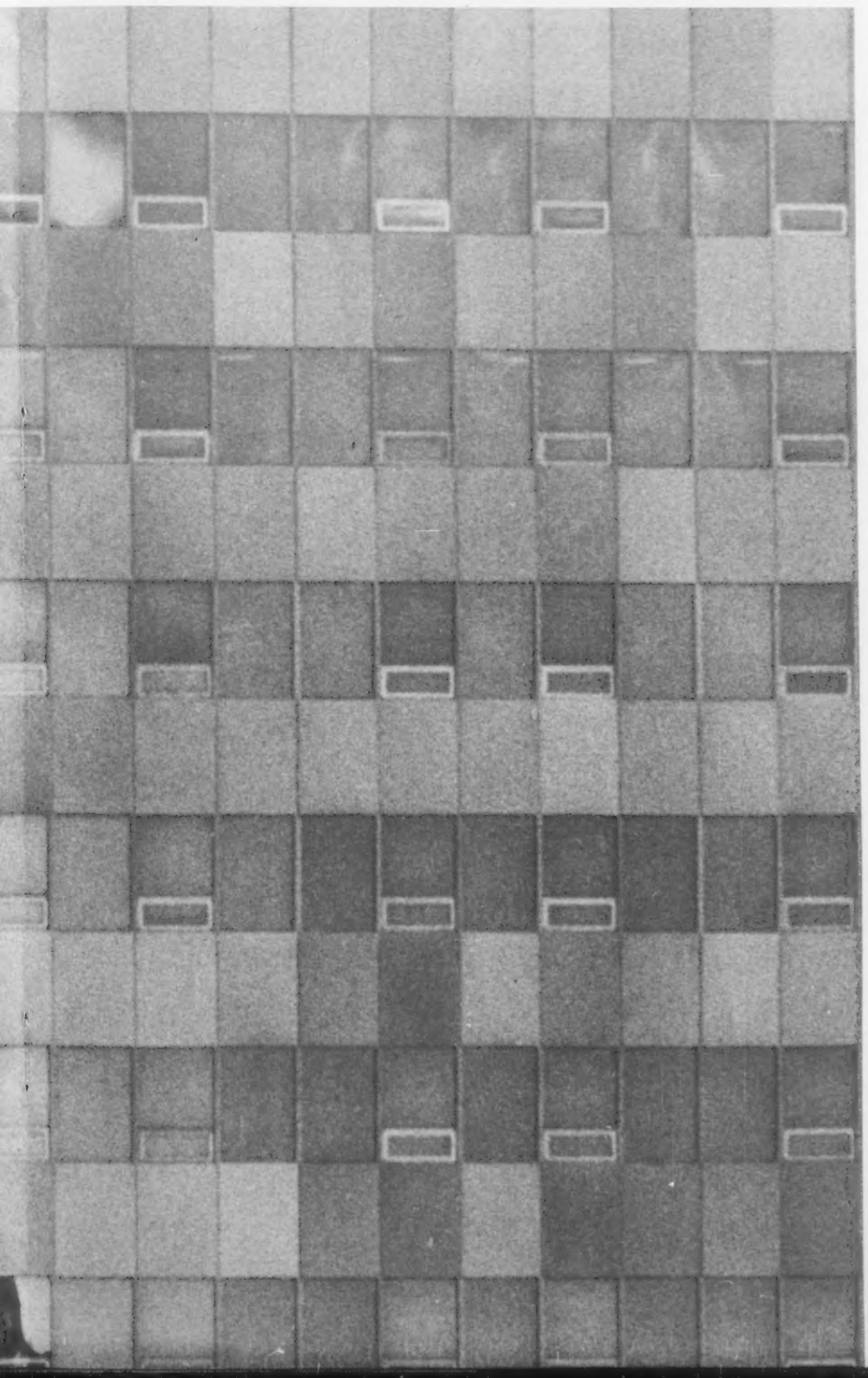

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Relational/network data base management systems. Oracle's entrance into the microcomputer DBMS market and the delivery of products like MDBS, a Codasyl-oriented package marketed by ISE-USA, point up the increasing sophistication of the DBMS software available for personal computer users. Few users will require the capabilities these packages offer, and fewer still will understand the data base structures they support. Nevertheless, it is important to describe how the packages are classified based upon these structures. After all, many a sale has hinged on the way these products are characterized.

Commercial data base management systems are grouped by their file structures, which fall primarily into three types:

- Hierarchical DBMS packages are distinguished by the relationship between records in the file — in this case by tree structures in which every child, for instance, has only one parent.
- Network systems predominate in today's marketplace. A network DBMS (upon which the Codasyl standards are based) emphasizes a concept that centers around "sets" of records. A member of a set can have only one parent in the same set, but may have a second parent or third parent as long as each is in a different set. Consequently, a record may be owned by more than one parent and by more than one set, which permits different associations between records.
- Relational DBMS software describes a system that manages data bases constructed from associations in two-dimensional tabular form. Normalization is the technique used by relational model enthusiasts to define and create these flat files. The simplicity of the model lies in the fact that all relations have this form, and the navigation between these tables (joins) is accomplished through a comparison of attributes with the same data type. Consequently, the embedded linkages (pointers) so characteristic of hierarchic and network systems are no longer employed; the user's view of the data is independent of how the data is physically structured.

The vendors of relational DBMS packages believe the friendliness of their products makes them eminently marketable. For this reason, personal computer software suppliers have done quite a lot of advertising in the press, hailing the relational features of their products. In actuality, their products have menu-driven screens or are derived from spreadsheet tables/cells, all of which are important friendly, accessible front-end features.

Integrated data base product lines: Many vendors of data base programs (as opposed to DBMS packages) have spent large portions of their research and development budgets on developing products to enhance and enlarge the capabilities in their product lines. Others have integrated a number of different applications into a single system. Yet another group of software houses are independently targeting a product's large installed base with a series of offerings. These avenues will certainly continue into the future and will become the strategy of the data base management system shop as well.

Visicorp's Visiseries is a preeminent example of the kind of development that has resulted in a wide number of different packages coming from a single source. Lotus Development's 1-2-3 and ISE's Knowledgeman are clear examples of the integration into one system of a number of functions, one of which is data management. And there are vendors like Fox and Geller that offer Quickcode, a program generator; D-Graph, a graphics package; and D-Util, a utilities product for users of Ashton-Tate's Dbase II program.

With the wider implementation of DBMS on personal computers, these same kinds of capabilities will be sure to follow.

In conclusion, advances in data base technology suggest that significant change and hectic activity will characterize the data base marketplace for years to come. As evidenced above, numerous participants are expanding the capabilities of the personal computer user by choosing to market and implement a variety of new and diverse products. Clearly, the progress that will occur in end-user computing across the 1980s will be closely tied to the fortunes of these suppliers and to the distribution of resources as yet undefined. OA

Morley is manager of software and computer services research at International Data Corp. research firm in Framingham, Mass.

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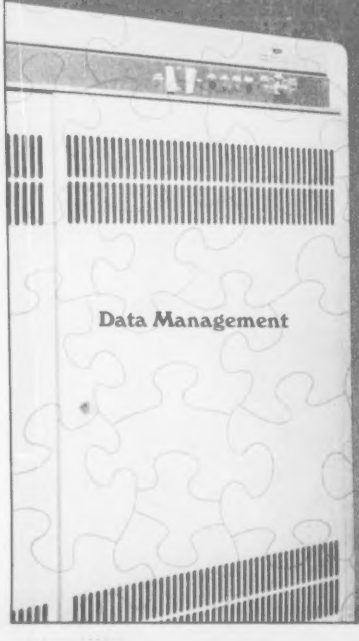
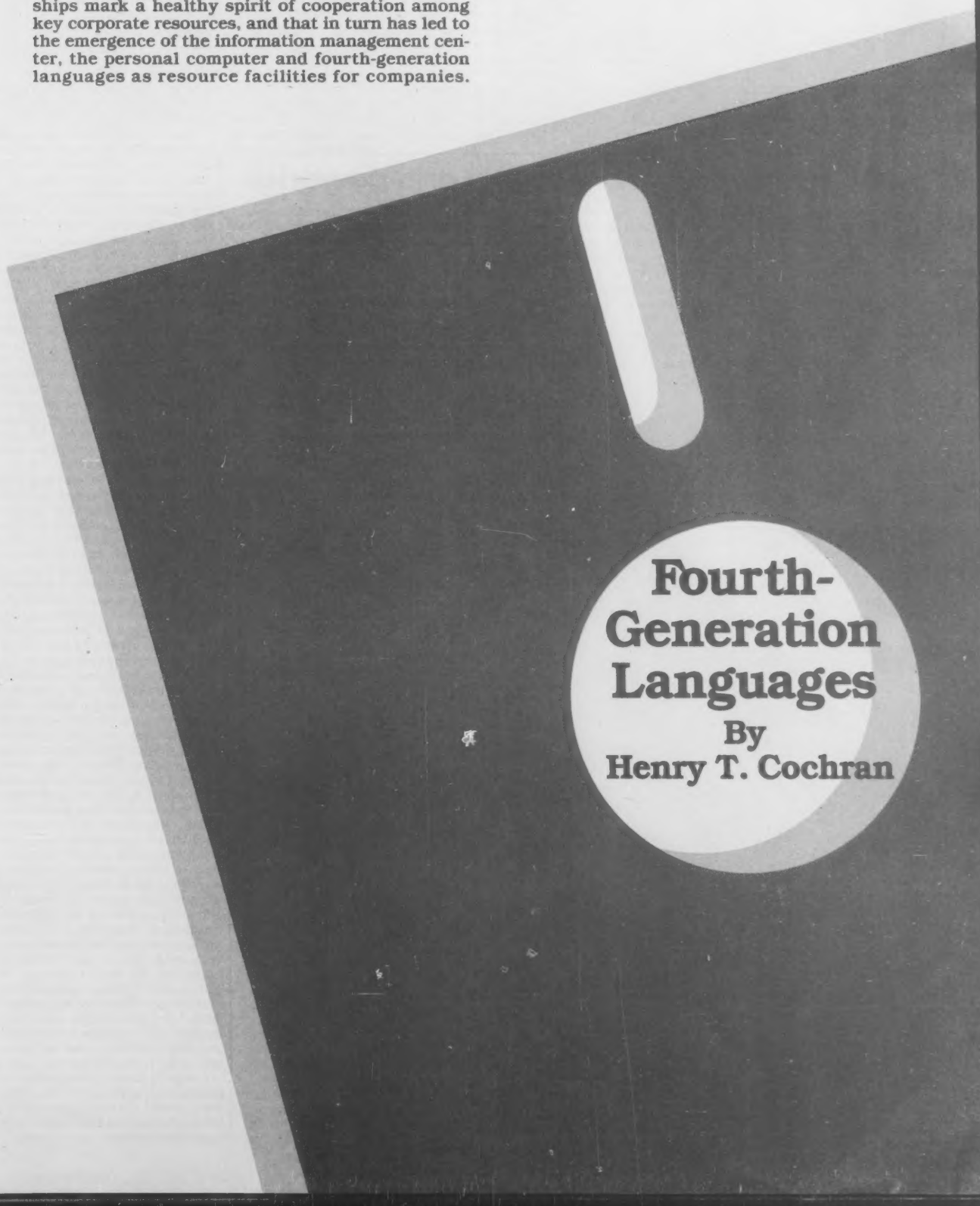


Traditional roles of data processing and business professionals are being revolutionized. Business users are increasingly asking for automation to simplify department management, development of business plans and scheduling of personal activities. In response, the computer professional is becoming less of a project design specialist and more of a consultant in grooming the business professional for computer self-sufficiency. These new relationships mark a healthy spirit of cooperation among key corporate resources, and that in turn has led to the emergence of the information management center, the personal computer and fourth-generation languages as resource facilities for companies.



Fourth-Generation Languages

By
Henry T. Cochran

These tools bring self-sufficiency to end users and guide them in becoming responsible for the development and maintenance of their own tasks.

One management information systems (MIS) manager described his department's philosophy this way: "We give our users the tools and guidance they need to automate their own solutions. They can create exactly what they need at the time it's required. If needed, we're available with the assistance and guidance they may need to be successful." With experience, business users become adept at using the computer as a tool to solve tactical and strategic problems, and DP staffs can focus attention on the operational problems of the corporation.

In addition, the latest wave of personal computer products has dramatically influenced what managers and professionals have come to expect from their computer resource. For the business user who has experienced the frustration of waiting in the DP backlog queue, the promise of these new tools that solve problems at a more individualized level and with a minimum of effort has great appeal. Management is no longer interested in the computer solely for its role in handling conventional operational tasks such as payroll, accounts receivable, purchasing and order entry. Now it is seen as a management tool for identifying and analyzing long-term trends and issues of strategic importance to the business.

There are several ways of personalizing the computer. Obviously, one can use a personal computer. Personal applications, such as the many spreadsheet systems, are also available today. These options are the best known because of the newness of the technology and the resulting media interest in the explosive growth of this new marketplace.

Perhaps less well known but equally powerful are the fourth-generation personal computing languages. These general-purpose software tools are easily applied on a larger organizational scale to accomplish the same personalized approach to solving individual and departmental problems.

Originally offered in the mid-1970's, fourth-generation languages have recently come into their own, often accompanying data management systems. Many also have links to related special-purpose functions, such as word processing, document retrieval and financial modeling. With these integrated fourth-generation language systems, the user has ready access to multiple functions on a single hardware system and does not have to be concerned with loading on new software for each operation.

Fourth-generation languages are appealing for a number of reasons. They incorporate familiar English commands that are easy to understand and to apply. The commands are powerful: A few words accomplish complete tasks, for example, designing a file (DEFINE), adding data (ADD), locating information based on very specific criteria (RESELECT FOR) or printing a report (REPORT). With one day of training, computer novices can implement a complete application from describing the data file, designing a unique formatted data entry screen, to writing special reports. On the other hand, systems analysts can prototype and test an entire application in less time than would be spent on the system specification using conventional methods.

Fourth-generation languages provide tremendous flexibility. Focused departmental applications are quickly developed to accomplish a single purpose, as in establishing an order flow tracking system. This system, or elements of it, can easily be linked or merged with selected information in production, purchasing and billing systems. When internal resources are combined in this manner, each department or individual becomes responsible for the information it references or acts upon, rather than for an entire system. The focus is on the specific business problem or activity, not on the preparation and manipulation of data. As a result, users of these languages feel comfortable with the computer as a tool to solve their own problems.

DP departments have found that fourth-generation languages enable them to provide faster response to their user departments, particularly in handling ad hoc queries and reports. These are often time-sensitive requests for summary reports or minor changes to standard reports; they may look like simple cosmetic changes, but they typically require a fair amount of system staff time to format or reprogram. With the fourth-generation languages, end users can easily collect and print only the information they need. When end users are able to handle these requests themselves, applications backlogs are reduced dramatically and the DP professionals can focus their expertise on larger applications.

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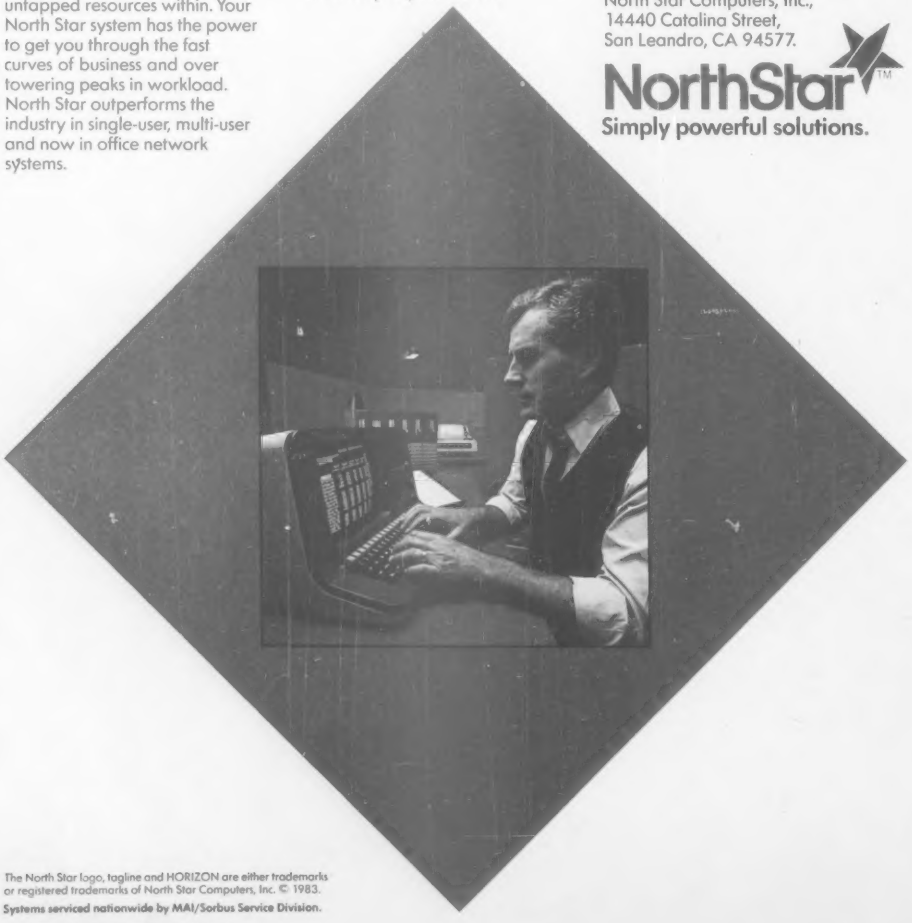

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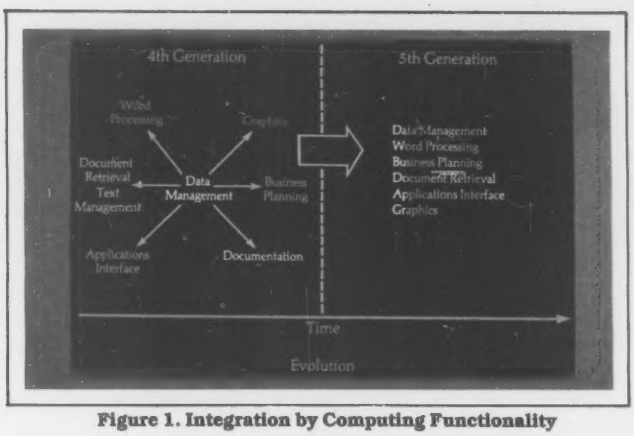

Figure 1. Integration by Computing Functionality

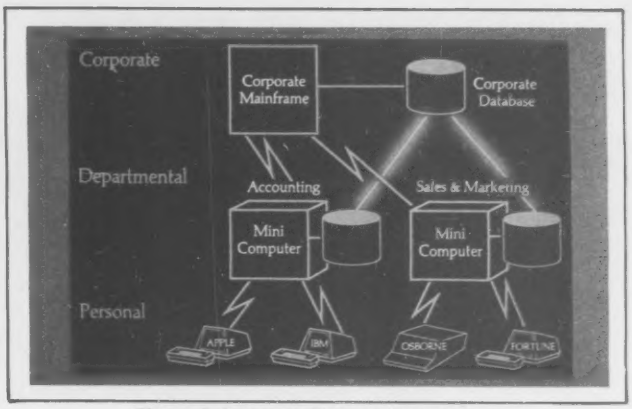

Figure 2. Integrated Computing Resources

The advent of personal computing languages has given DP professionals and business end users a choice of tools for a given application. Personal computing languages are preferable under the following conditions:

- Quick application implementation is key.
- It's a one-time request.
- Modifications to the application are anticipated.
- Leverage through integrated tools such as business graphics or word processing is desirable.
- Local control and maintenance is preferred.

For a personal computing tool to be an effective end-user support resource, it must contain some key features. Ease of use is most important. The language must be as comfortable and clear to use as English. Ease of use also extends to the ability to create a file and perform simple data entry. More complex data entry, aided by formatted screens, editing and data manipulation is also important to ensure that information is entered accurately.

Another key criterion is the ability to reference a file and quickly produce reports that incorporate specific information and calculations. And, while relational data management may not mean much to an end user, it is an important consideration; it allows that user to extract information from multiple file sources and to build a customized view of a problem. Relational data structures replicate traditional manual systems and allow the user to concentrate on results, not data.

How is the fourth-generation language integrated into the modern business entity? Based on the type of business, the computing resource may be centralized and managed exclusively by the DP department or distributed to users. Applications development may also be handled completely by MIS or by the end user. Often it is a combination of the two. The personal computing phenomenon is clearly stimulating the move toward the localized use of the resource and increased end-user responsibility for applications development.

Overall, we can identify four common computing environments: traditional centralized computing, departmental systems, OA and personal computing. The first two are classical examples of computer use within organizations. OA and personal computing are new implementations, often discussed but still in the process of formal definition.

Traditional computing is most familiar because it has been used longest. Here, the computer resource is centralized in one self-contained department that handles all the computing requirements of the entire organization. In this environment, the fourth-generation language is used both as a prototyping tool for designing and testing complete application systems and as an applications development tool used by programmers and analysts to design and maintain departmental level applications. With fourth-generation languages, projects are complete and ready to use in one-quarter to one-tenth the time required by conventional methods.

Departmental systems are a variation of the centralized computing theme. Local departments have their own computing resource for managing local information requirements. In many companies, departments have use of a dedicated minicomputer for this purpose; in others, many departments share a common company system. Fourth-generation languages expedite the design and implementation of systems to automate departmental activities and give the administrative and professional users basic tools for self-sufficiency in data entry, file inquiries and customized reporting. The centralized DP resource carries on the design and maintenance of key operational applications and is available to the department as a technical resource for problem resolution.

In OA and personal computing, the computing tools (terminals and software) are applied purely at the discretion of the individual or department. Many organizations are tending to overlap or merge these two departments.

In OA, the focus is twofold. The most common use is to enhance the productivity of secretarial and administrative staff in preparing and handling documents. However, OA tools like text management and document retrieval systems also enhance the decision-making effectiveness of managerial and professional staff. Fourth-generation language systems with their inherent data management capabilities have been linked with word processors, text management systems and document retrieval systems to satisfy the requirements of these office professionals.

Personal computing, the fourth environment, is entirely subjective. The purpose of the personal computing tool — the computer, the computing software system or the computing language — is to equip the user to define a problem in his own terms and summon the resources of the computer to solve that problem. Used in this way, the fourth-generation language and integrated software tools for data management, business planning, business graphics and document retrieval can be applied to improve managerial insight and effectiveness at a highly individualized level.

Regardless of the computing environment and management orientation, the fourth-generation language is the one tool that can be integrated at all levels.

Today, ease-of-use fourth-generation language systems link word processing, financial modeling and business graphics with data and text management and even with specialized departmental applications. This new ability to combine information management resources with special-purpose tools has made possible new and better ways to handle tedious and cumbersome manual processes and to gain insight for problem solving. Professionals can now use electronic filing and retrieval systems for access to documents for litigation support or competitive research. Data and text management systems can be used for producing an analysis of a budget vs. actual incorporating variance explanation. Business planning systems can be linked to informa-

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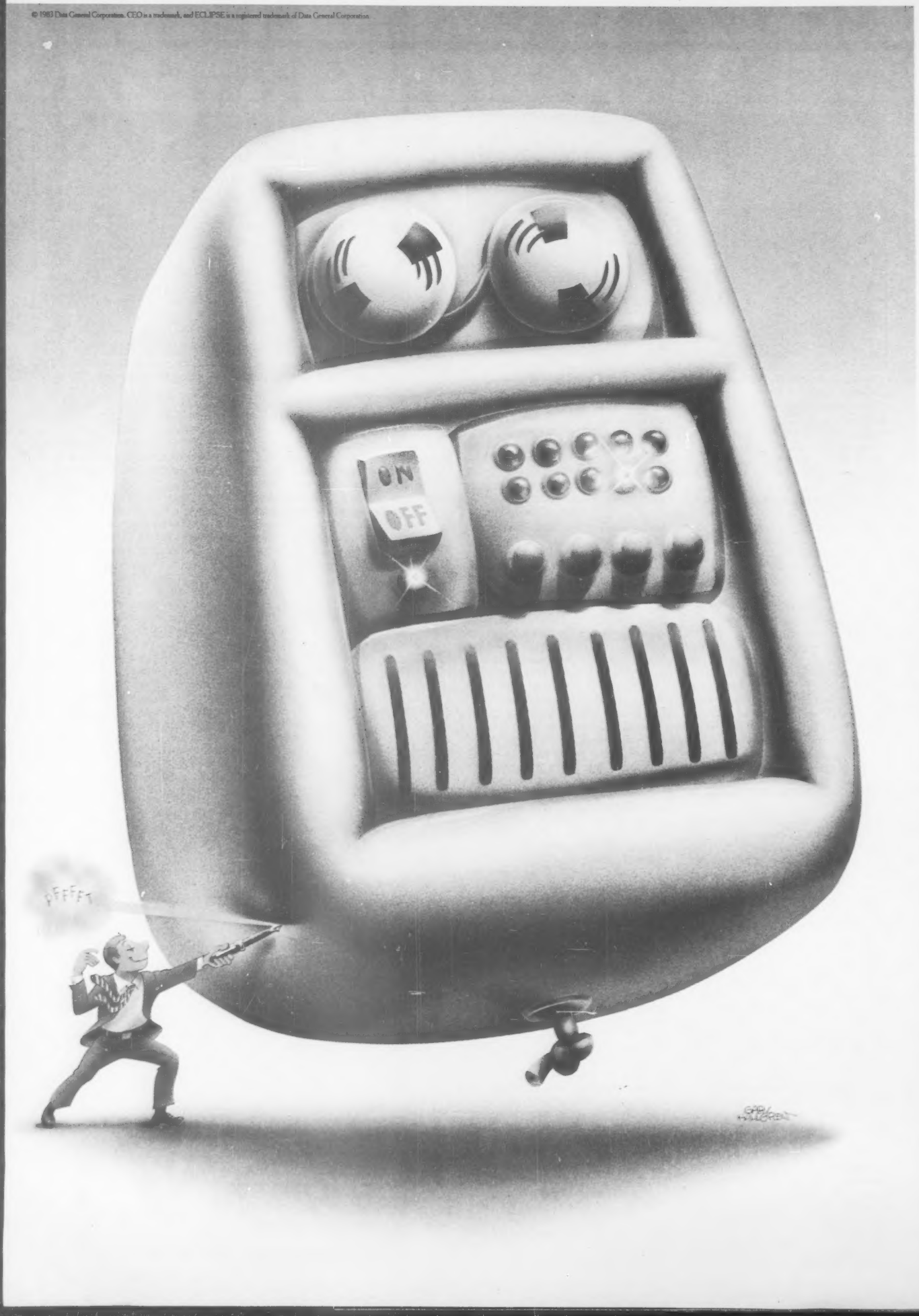

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As powerful and productive as the fourth-generation language systems have been in responding to the demands of the personal computing revolution, they are not the final answer. Products able to respond to a broad range of application requirements today — from data management, to OA, to financial modeling — are still in the evolutionary state, the result of linking several separate products.

The ideal is a single complete product specifically designed to accommodate all the computing needs of the business professional with one consistent user interface. A single product that runs on the personal micro, the departmental mini and the corporate mainframe is the key concept. By this definition, the true fifth-generation language cannot be an adaptation of systems available today.

The fifth-generation language systems now in development promise to be a completely new class of product and are destined to redefine the concept of user-friendly. We'll see a much higher level user interface than is currently available, with new features that combine the best of today's hardware and software products. They will be self-prompted systems requiring only a cursory orientation and minimal training because of their close similarity to conversational English and the extensive reference cues embedded in the user interface. The working screen may be split into multiple windows to allow several processes to be monitored at one time. Multiple functions will work simultaneously so documents can be prepared with text, charts and models, "cutting and pasting" on-line.

At a minimum, the fifth-generation language will combine data management, business graphics, WP, free-text retrieval, spreadsheet analysis and electronic mail. They will also incorporate the best of communications and networking technologies to expedite corporatewide sharing of information, regardless of the geographic location of the business facility. All the mechanics of the transfers will be transparent to the user.

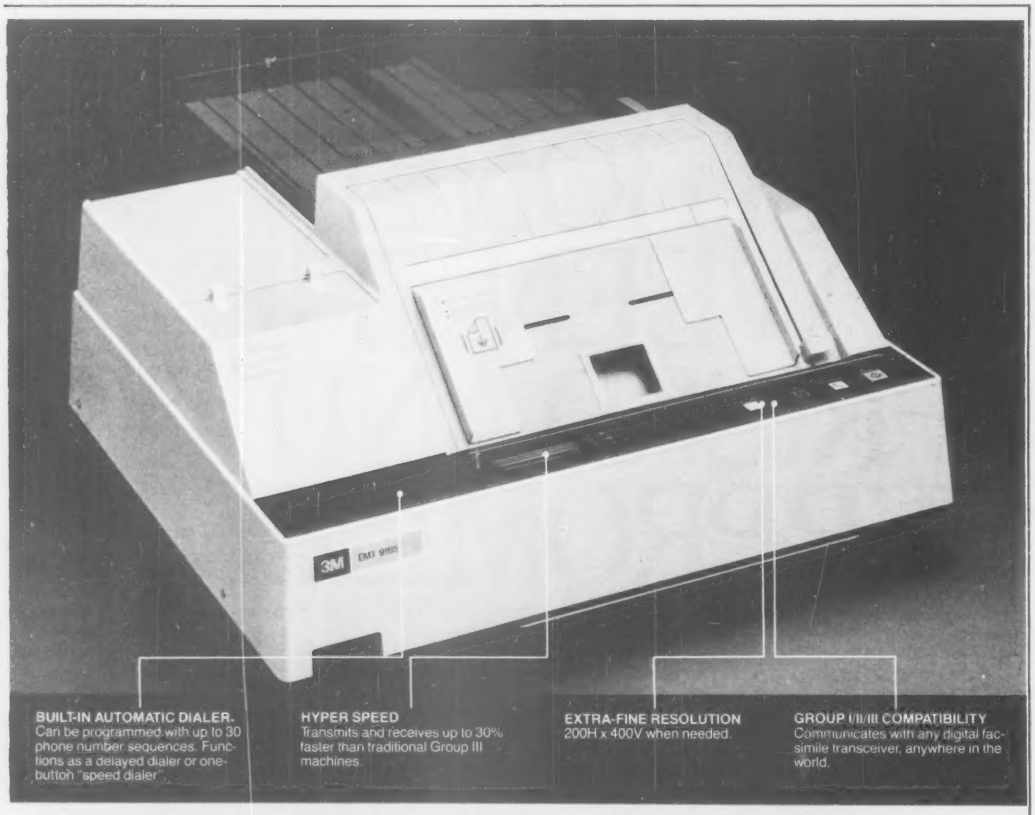
The fifth-generation language will be cross-compatible with the operating systems of all major computer systems — mainframe, minicomputer and microcomputer. Information will be able to be accessed for individualized problem solving, regardless of where it is located.

The ultimate objective of the fifth-generation system is to make the computer terminal as comfortable a business tool as the desk, where business documents are always within reach — to be touched, read and filed. And working with that information will become as easy as wielding a pen.

As dramatic as these concepts may sound today, the new generation is clearly in sight. In fact, elements of it are already available. Windowed screens, pointers to symbolic pictures and touch-sensitive screens are here today. Software products are beginning to merge multiple functions into one package.

These are key events on the way to the final solution — one product, with relational data management at the core, a single consistent user interface, compatibility with common operating systems from micro to mainframe and networked for information sharing on a global perspective. This solution will provide truly integrated software systems for decision support. OA

Cochran is president of Henco Software, Inc., a software firm in Waltham, Mass.



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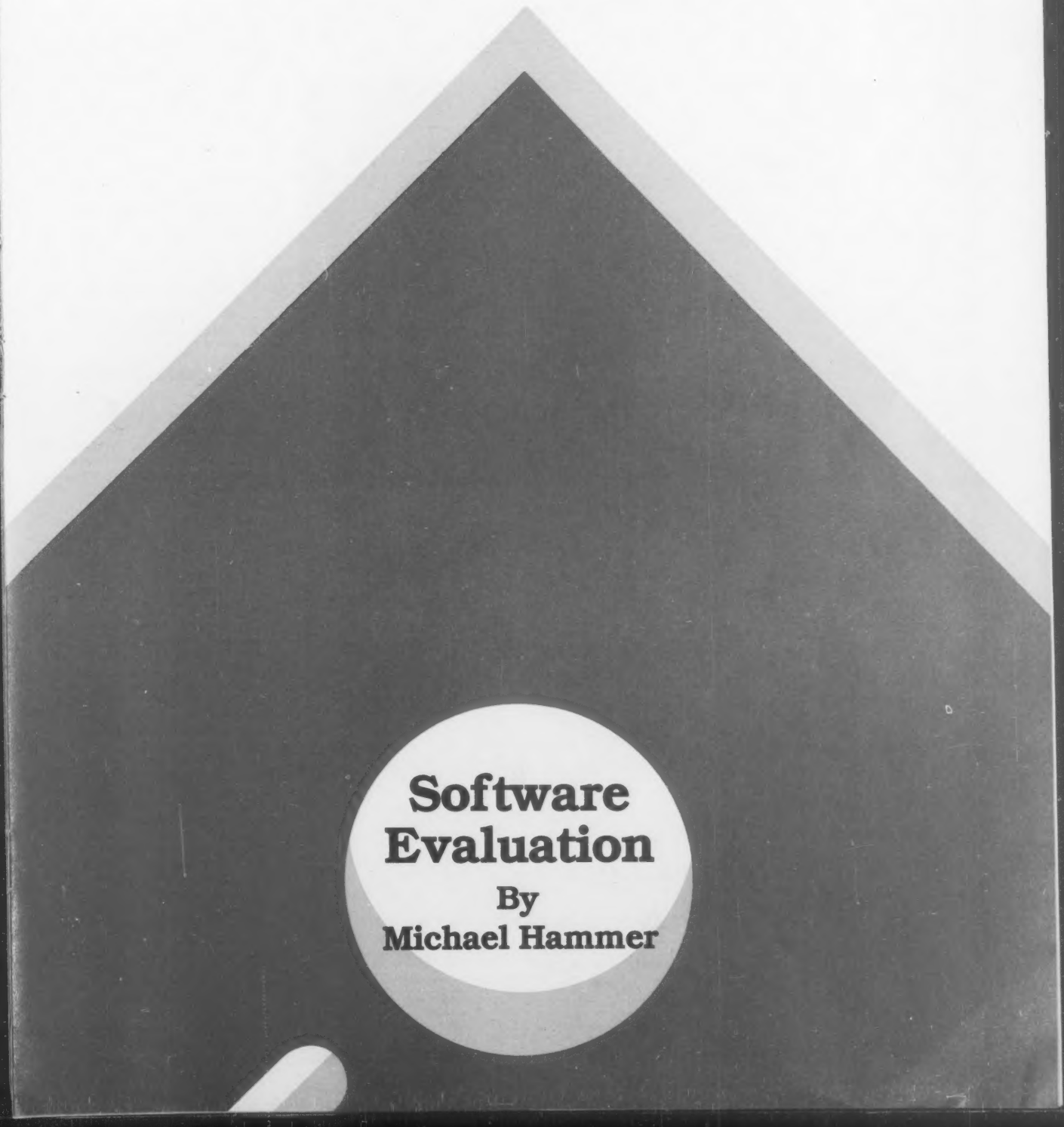
A new cliche is abroad in the land of office automation. Pundits, analysts and commentators have concluded that software, not hardware, is the key component of an OA system.

Software is clearly the rage. Venture capitalists are falling over each other to fund the start-up of new software companies, and existing companies are being bought out at incredible prices. This discovery of software comes as a surprise only to those who regularly watch television when nothing is being broadcast. Except in the case of a few old hard-wired machines, the functionality of a modern office system is delivered by software applications running on a hardware base. Hardware is just a pile of electronics until complemented by software. Why, then, the



Software Evaluation

By
Michael Hammer

sudden fascination? One reason is that hardware is increasingly becoming a commodity, both literally and figuratively. There is growing standardization (or at least similarity) among the hardware components that form an OA system. Systems integrators have been increasingly acquiring these components from the same small set of suppliers. As a result, both value-added and differentiation are more and more often coming from the soft areas: service, marketing, support and, in particular, software.

Moreover, the last three to four years have seen the flowering of software packages, especially in the office systems arena. Until recently, office systems software was almost always bundled with the hardware; it was developed (directly or otherwise) by the systems vendor and sold together with its hardware base. As a result, the customer typically bought a complete, fixed-function system. The notion of software as a separately configured, priced and purchased product was not widespread.

Historically, software products (packages) were confined to relatively narrow segments of the DP industry. Although packages were built and sold in wide varieties, their major successes were in three areas:

- Large-scale and complex system software products, such as data base management systems, whose construction would have exceeded the capacity of user organizations.
- Nonstrategic applications for large DP users — typically financial applications from payroll to general ledger — where the advantages of in-house development (in terms of functionality) were more than outweighed by the cost, timeliness and reliability advantages associated with package acquisition.
- Applications for small organizations with neither the expertise nor the resources to develop software themselves.

The personal computer was a major force in bringing the software package to the office environment. The personal computer delivers to an individual's desk the computational resources of a significant general-purpose computer. Software is at the heart of this capability. Such an individual could not be expected to write all required software, and a host of suppliers sprang up to develop and distribute this software.

For the first two years of the personal computer era, personal computing and office automation were widely viewed as disjoint. OA products were closed-end, limited-function devices without even the capability of running additional software. More recently, however, the industry has recognized that lurking under every OA product is a general-purpose computer, capable of supporting additional software packages and thereby acquiring a broader functionality.

"The industry recently recognized that lurking under every OA product is a general-purpose computer that can support additional software."

It is now widely recognized that the personal computer is a fundamental component of an office system, and personal computer-like capabilities (in the form of personal computer operating systems) are increasingly being added to products otherwise labeled office systems. As a result, individuals responsible for OA must now also develop guidelines and techniques for evaluating and acquiring software packages for personal computers and office products.

This responsibility represents a major new challenge to OA and DP groups. Vendors developing OA software and distribution channels that bring these products to the customer differ significantly from those with which many organizations are comfortable and familiar. In addition, OA and personal computer software systems have different characteristics and objectives from software products used in more conventional DP environments. For these reasons, organizations must develop criteria and means for assessing the appropriateness and quality of software products.

The contemporary software scene is awash in hyperbole and cliches. Such terms as "powerful," "flexible," "user-friendly" and "easy to learn" are tossed about with careless abandon. No one is quite sure exactly what these terms mean. However, everyone seems to agree these characteristics are all good things, and all vendors are certain their packages have them in abundance.

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More than any other, the issue of user interfaces and their ease of learning and use is one in which imaginations are given free rein and extravagant claims are the norm.

Thoreau once said, "Patriotism is the last refuge of the scoundrel." Today, that remark might be better applied to "user-friendly." There is no agreed-upon definition for the term nor any standard for what constitutes a truly usable system. "Ease of use" often seems to be like pornography: We may be unable to define it, but we know it when we see it.

"Ease of learning" and "ease of use" are often used interchangeably. The two concepts have some relationships, but they are quite distinct and often antithetical. On the whole, ease of learning refers to the simplicity with which a novice casual user, unfamiliar with the system, can develop a sufficient comprehension of the system and its capabilities to accomplish some useful work with it. Ease of use usually refers to how readily a more sophisticated and experienced "power" user can exploit the potentials of the system. The factors that make a system easy to learn are often very different from — and in fact may be inconsistent with — those that make it easy to use.

The key issue in making a software package easy to learn is to reduce the user's anxiety factor by making the system as familiar as possible. A system is easy to learn if in fact there is not very much new about it that the user has to learn. The goal is for the user to approach the system already familiar with many of its concepts and much of its terminology. A system that requires a casual user to learn a new mode of thinking and an entirely new vocabulary can prevent a novice from coming to grips with it. All too often, computer jargon finds its way into systems designed by even the most well-intentioned.

To a non-technically oriented individual, software systems appear to operate by magic, and this is often overlooked in user interface design. Users who do not possess an understanding of the internal operation of a system treat it like a black box and induce a model of its operation from their observation of its behavior. People inevitably build conceptual models of tools they use. Such models are not expressed in technical terms, but in terms of elements and structures from other domains with which the user is familiar. (For example, the user of a word processor may think of his screen as corresponding to a sheet of paper and the operations performed as corresponding to activities that could be done with a typewriter.)

It is important that the user's conceptual model be operationally correct. A user should be able to predict accurately the effect of any command by thinking about it in terms of the analogous model he has developed in his mind. Confusion, not ignorance, is the enemy of ease of learning. If a novice does not know what a command means, no great harm is done. Trouble begins when he incorrectly thinks he knows what it means and his observation of its behavior does not match his expectation. At this point, the user's frustration boils over; he throws up his hands and declares the system makes no sense. It is very important that the system be designed in such a way that the user's apprehended model of its operation provides an accurate basis for use.

"A system that requires a casual user to learn a new mode of thinking and new vocabulary can prevent a novice from coming to grips with it."

An easy-to-learn system must be designed to be learned. Novices are rarely able to comprehend the full capability and utility of a system when they first approach it. They should not have to learn system facilities and concepts they do not need, in order to use those they do need. Modular design is a principle that applies not only to the internal design of software systems, but to their interfaces as well. The style of an interface should be such that the user does not confront things he does not understand until he is ready for them. The command set should be organized in such a way that minimal subsets can be readily learned and used.

To reduce a novice's anxiety factor, the system should provide assistance, feedback and a forgiving working environment. Helpful system prompts, menus, on-line documentation and the ability to roll back regretted actions are

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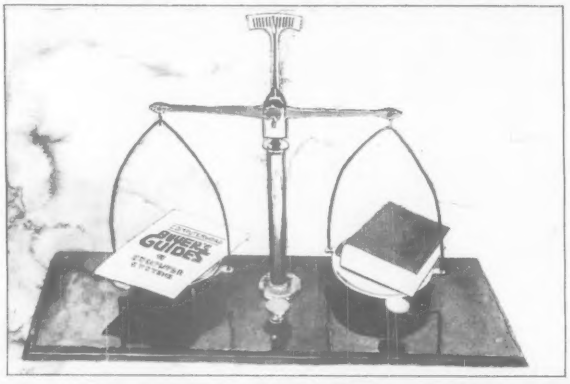

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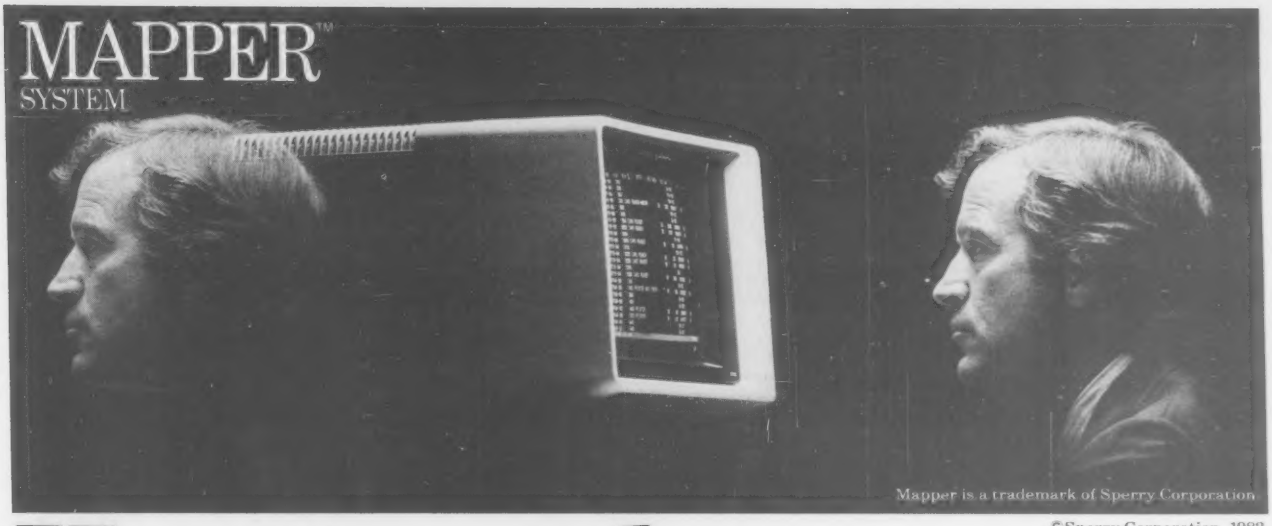

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among the techniques employed to achieve this kind of pleasant context.

Balanced against the factors that make a system easy to learn are those that make it easy to use for someone who has already learned it. The simplicity, helpfulness and friendliness that characterize an easy-to-learn system are usually annoying and often counterproductive for more experienced users. The experienced user has already internalized a model of the system and its capabilities.

For a "power" user, the principal design objective is efficiency. The experienced user knows what he wants to do and, usually, how he wants to do it. He needs a system that allows him to get his work done quickly and painlessly and that keeps out of his way. It should also provide a rich set of powerful tools. The casual user may find these tools sophisticated and even complex, and their number overwhelming. However, they offer relief from frustration and drudgery to a "power user," who has invested the requisite time in learning and understanding these features. While perhaps not user-friendly, a powerful and flexible system is often most usable because it allows a user to extract from the computer the maximum functionality with a minimum of overhead.

Thus, the designer of an easy-to-use system must anticipate the broad range of users' needs and provide a set of commands that allows such users to accomplish their objectives as directly and quickly as possible. Minimization of overhead and conceptual efficiency are key design objectives. The experienced user is likely to find a small set of easy-to-learn features terribly difficult to apply to any interesting complex problem. The utilization of such primitives often entails additional steps, both in formulating a mode of attack and in carrying it out. The user wants a system that allows him to accomplish directly what he wants to do. A large collection of powerful commands is often the hallmark of an easy-to-use system.

However, simply tossing together every possible desirable feature, plus the kitchen sink, does not yield ease of use; it yields a mess. Consistency and a set of unifying principles are the glue that holds together what would otherwise be a chaotic collection of unrelated features. The entire system must have an underlying logic that, when appreciated by the user, provides a reliable means of remembering the system's capabilities and even deducing the meaning of new constructs. Even a sophisticated user will not use all parts of a system with equal frequency, and therefore requires assistance in remembering features used less frequently. Moreover, this user is likely to explore the fringes of a system, searching for advanced capabilities, and should be equipped to do so on his own.

Natural and familiar concepts may be inadequate to carry this off. But, although they may be individually complex, the set of principles underlying the system must be few in number. When basic concepts or exceptions to the rules proliferate, harmful complexity results.

Part of a system's efficiency is determined by how well it assists the user in avoiding errors and waste. The virtues of systems that allow for graceful recovery from mistakes have been well-publicized. Attention should also be given to design features that inhibit making such mistakes in the first place. Careful keyboard layout and command naming are major steps to achieving this end.

A frequent user should also be able to personalize the system, whether to rename commands in a fashion more congenial to him, to create new commands from sequences of old ones or to cause certain activities to be performed automatically at designated times.

In the best of all possible worlds, a system would be both easy to learn and easy to use. It would achieve this by presenting to the novice a subset of its capabilities that are useful, but not so powerful as to be intimidating. The user could acquire this easy-to-learn part of the system and gradually come to terms with its more powerful features.

Alas, such designs are rare, and not just because of the blindness of system developers. Many applications do not readily lend themselves to such a multilevel interface. In reality, we must confront the question, "How important is user-friendliness?" We must confront trade-offs and compromise. User-friendliness is usually achieved at the expense of some factor, typically system capability or ease of use for the more experienced user.

The question of the importance of ease of learning cannot be answered in general; it depends in a major way on the characteristics of the individual application. If an application has a very high value to the user, the interface must be

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very bad indeed to prevent him from using it. For applications of marginal value, where the user is not compelled to employ the system, a hard-to-learn interface may discourage a user from ever getting started.

On the whole, the issue of user-friendliness is currently being overplayed. In the long run, the success of a software system will be determined more by functionality and ease of use than by whether it can be learned in one hour or two. The factors that militate toward ease of learning at the expense of other criteria are temporary and declining in significance. These include such issues as user populations unfamiliar and uncomfortable with computer systems, and a milieu in which the use of automated systems is still something of a novelty. We are inevitably heading into an era in which computer literacy is the norm rather than the exception, utilization of computer systems is the standard mode of operation and extraction of maximum capability from available tools is essential. In this environment, users can be expected to make the investment needed to learn a system, provided it offers them substantial functionality that can be effectively harnessed. In other words, the casual user may be an artifact and a transient phenomenon.

Which brings us to another contemporary fad: the all-inclusive, integrated software package that provides a range of capabilities, typically with a more or less consistent interface across the functions, as well as the ability to move conveniently from one subsystem to another. The particular functions vary from system to system, but typically they include word processing, records processing, spreadsheet and graphics tools. They may also include such things as electronic mail and a calendar.

Although it is certainly preferable to have a collection of integrated tools rather than the same tools on a nonintegrated basis, the simple fact of bundling and integrating these tools will not compensate for deficiences in their individual functionalities. Office automation is not synergistic. A collection of mediocre components remains mediocre and does not achieve additional value because of its integration. As a rule, an office system user does not need rudimentary capability in a number of areas. Rather, the user requires extensive functionality in a particular area — the motivating application driving the use of the system. Other functions, while desirable, cannot be provided at the expense of the core capability.

Other factors besides functionality, ease of learning and ease of use contribute to the quality of an OA software package. The quality of the documentation, both as a learning aid and as an ongoing reference, is of major importance. The software itself is just part of the extended product that includes the documentation, training and support provided by the vendor. The vendor itself must be evaluated as part of the software selection process. Can its claims be believed? Does it have the resources to remain on the scene at least for the expected lifetime of its products?

"The success of a software system will be determined more by functionality and ease of use than by whether it can be learned in one hour or two."

Although careful evaluation of prospective OA and personal computer software packages is indicated, a lengthy and costly evaluation process is often out of the question. User demand for software is very high, and an OA organization that delays its users while it conducts lengthy evaluations will soon acquire a reputation for heel-dragging.

In any event, there are too many software packages, with new ones being introduced all the time, to allow a user organization to do a thorough review of all the alternatives. OA departments will have to identify external sources of information and evaluation upon whom they can rely for assessments of software packages — assessments that will have to be interpreted in the light of the organization's unique requirements and experience. ‡ OA

Hammer is president of Hammer and Co., a Cambridge, Mass., management consulting firm specializing in the impact of new technology. He is also an associate professor of computer science at MIT.

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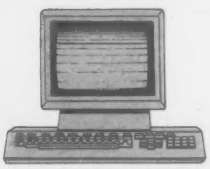
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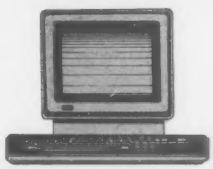
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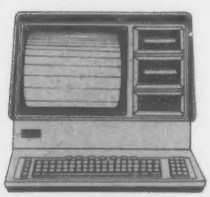
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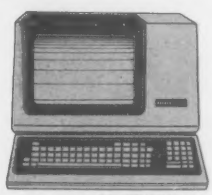
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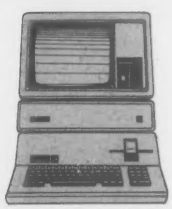
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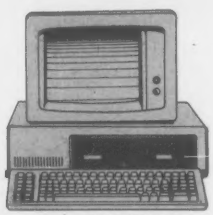
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Micro Software And DSS

By Robert J. Earle

The advent of powerful 16-bit personal computers and the vast array of accompanying software have opened up new ways of managing information. Software, particularly decision support systems, will play a key role in this information management. New capabilities dawned with the arrival of powerful personal computers such as IBM's Personal Computer. Earlier versions, such as Apple Computer, Inc.'s Apple, were run by an 8-bit microprocessor chip, adequate for processing small amounts of data or for working in a nonbusiness environment where response time is not a critical factor. In business, however, information needs require more storage, more voluminous and complex processing and the

ability to both receive and output information to any variety of devices; the 8-bit microprocessor is too small.

Developing capabilities that arrived with the 16-bit machines give each user power that approaches that of a single mainframe user via a time-sharing service. Such power is crucial to putting the personal computer to work in the office, because a great deal of mainframe-style software may now be applied to nearly any task imaginable without the need to be or to employ a programmer.

The software for the personal computer either runs or it doesn't. It either meets your needs or it doesn't. And, if one program doesn't do what is needed, you can always try other choices until you arrive at the proper solution.

Putting the micro to work in the office environment involves two main areas of concentration: ongoing operations important only to specific departments, and planning functions requiring interaction with other facilities in the organization. In both situations, the software needs certain characteristics to be successful:

- It must functionally meet the purpose at hand.
- It must be easy for nontechnical people to use. This is the "user-friendly" tag we hear about. It means the software will perform complex tasks through single-letter menu selection or via single-function key operation. The choices offered in menus, processing messages and errors should be described in everyday English as well.
- It must allow integration of functions. The user should not have to switch from a word processing system to a spreadsheet to a graphics package. Rather, the software should all work together as much as possible, using commonly developed information. At this stage of technology, all software cannot be integrated, but a basis is being laid for thorough integration. Methods also exist to integrate key functions within particular software environments. Such software carries "integrated" or "distributed" labels in its product claims.
- It must be transportable, not only between micros, but even throughout a hardware environment. A few software vendors offer products whose operating characteristics are the same from one machine to the next, which makes such knowledge transportable. A few software companies have developed ways to allow information to be uploaded and downloaded throughout a hardware environment. As yet, however, it is impossible to find systems that allow a disk from one computer to be inserted into another and have complete transportability.
- It must be compatible with an existing hardware/software environment. Technically, your new micro and related software should be able to communicate with existing mainframe and minicomputer equipment and should be able to access central files.
- It must be thoroughly documented with a good user manual, which means all terms are explained, the manual is indexed and tabbed and examples are shown of what screens are supposed to look like.
- It must work independently of internal technical support. Operating a group of microcomputers in an organization will possibly come under the responsibility of an information center manager, and some training or user assistance programs may exist. Technically, however, the software will not be supported by anyone inside the organization.

Let us assume you have reached the point of having management agree to let you automate the company's office functions with personal computers. What are the functions you can expect to automate? Who are the vendors involved? What should your expectations be, both for the short term and the long term?

Much has been written about word processing, and many good word processors are on the market today. In addition, computer-assisted writing (CAW) is being developed to help nonwriters develop ideas and structure documents before they ever need the word processor. CAW allows standard document structures to be created and stored for proposals and reports, along with boilerplate text for efficient reuse. Personal file information can be stored, manipulated and printed out on demand; this is the electronic Rolodex, personnel file or phone directory. Electronic mail among a group of micros is the equivalent of an internal memo system, but without the paper. Such systems are basic tools that will become as familiar to users as the typewriter and the photocopy machine.

For managers, the planning process is also now automated. The electronic spreadsheet idea opened the eyes of business to the potential value of personal computers in the office. The "visible calculator" put the computer to work to create an obvious savings for those who need to perform tedious spreadsheet calculations and recalculation.

But the planning process itself goes way beyond mere rows and columns. In the mainframe environment, comprehensive financial and business planning software packages have been developed into what have affectionately become known as decision support systems (DSS). A great deal of controversy exists in software circles about what a DSS is exactly, but our pragmatic definition describes it as any system that enables the user to sift quickly through complex information to get at specific results.

"Developing sophisticated integrated planning systems still requires a logical mind, and it doesn't hurt to have experience. However, as the power of mainframe software is brought to the micro level, managers can expect to put the technology to work without needing to be professional strategic planners."

Comprehensive DSS software will include an applications development language that can perform highly complex functions with a minimum of definition on the part of the user. In addition, such systems will allow automated, menu-driven systems for many kinds of financial exploration, such as what-if analysis and risk analysis. They will also allow the development of small prototype models that can be used to test the effect of varying each item under study.

Even so, developing sophisticated integrated planning systems still requires a logical mind, and it doesn't hurt to have a little experience. However, as the power of such mainframe software is brought to the micro level, managers can expect to put the technology to work without needing to be professional strategic planners. For example, when it comes time to present your portion of the annual budget, it would be of great benefit if you were able to see the whole budget spread over the next year, then take parts of it and make changes to see how the overall budget picture changes. Until recently, the sophisticated corporate budgeting and planning systems were written in DSS packages too sophisticated to download models to micros. With the advent of 16-bit micros, however, mainframe-style DSS have finally arrived. Users can now run their portion of the budget system off-line on a micro or develop their own models and upload and download both data and models to the mainframe.

The software will make managers better budget developers and will give end users more sophisticated modeling tools on a convenient, self-controlled micro. But what about gazing into the future? DSS systems help there as well. If each manager can have a plan about how best to handle increases or decreases in business, personnel, supplies and changes of product lines, the overall effectiveness of his department will be improved. Such "what if" capability exists with personal DSS products today.

Now imagine the value of having such a tool available throughout an entire corporation. In the budgeting process, micros become tremendously powerful and cost-effective off-line data entry devices through the use of inverse-video formatted screens exactly matching data entry sheets. Such usage from the lowest operating entity on the organization chart to the highest would produce more accurate budgets, and they could be prepared faster. In this context, the compatibility in a hardware/software organization becomes vital. To be effective, the software must be able to upload and download logic and data and to perform screen formatting, prompting and black-boxing controls for various models, plans, forecasts and budgets. Such a capability distributes responsibility for information integrity throughout the organization. It also allows ultimate decisions at the top to be based on realistic information from the trenches.

We all know how budgets are created: The corporate planning department analyzes the projections from the previous year, plugs in actual expenses and then prints out a nice report, which is sent to you in the intercompany envelope. You make your best guess about what the next year will bring, note that on the sheet, send it back up in the envelope and wait for the next round, which happens in a month or so.

All information in such an exchange is best handled on the computer. This is especially true if a micro-based DSS tool is available for modeling data in a customized fashion, while retaining total compatibility with the mainframe system. The micro provides the means to track, review and modify your projections throughout the year, independently of others. Yet, should the need arise to develop a model that could be of value to all, it can be distributed to both mainframe and micro users without compatibility problems.

The truly distributed decision support system is the most valuable of software tools, on all levels. CA

Earle is president of EPS, Inc., a software company in Windham, N.H.

Computer-Based Training

By Kate Barnes

Office automation and end-user computing are often characterized as being easy, quick and efficient. All those things are true — once you get the hang of them. However, achieving that first familiarization can be a threatening experience for many users. In addition, when a user does become familiar with one machine or software package, switching to a different machine or package can present a new threat.

Most users of automated tools have one thing in common. They want to reap the benefits of automation without wading through pages of accompanying documentation. The president of a major software company recently acknowledged that the majority of users want simply to insert a disk in their machines

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and get started — but today's software just isn't friendly enough for that approach.

As learning tools, vendor manuals and documentation can be difficult to master, and technology is still too complex to plug in and use.

With users in a hurry to learn and technology hard to understand, a gap exists. In an attempt to keep this gap from widening, some vendors have responded with classroom instruction and self-paced learning manuals. A brisk business has also emerged in third-party publishing of training guides.

However, problems still exist. Classroom training is expensive on a wide-scale basis. Training guides, whether produced by the vendor or a third party, can still lose the user's interest and/or understanding. An alternative method is the use of computer-based training. In computer-based training, a specially designed program teaches the student how to use a given piece of automated technology. The user is prompted and guided by the computer in learning about the technology.

Most users seem to appreciate learning via the computer, and some outright enjoy it. For example, Individual Software, Inc.'s "The Instructor" has successfully taught several of my neighbors how to use the IBM Personal Computer keyboard. Perhaps user reactions to computer-based training are best summed up by one user's response to a hands-on demonstration at a recent trade show. After working half-way through a training program on Wordstar, she turned to her companion and said, "Exactly what I want!"

Computer-based training offers many advantages over classroom or manual-directed alternatives:

• Environment: The user can get right to work on the machine he will be using.

• Simulation: Computer-based training programs typically simulate the characteristics of the machine or the software package being taught. Users are able to learn while doing. This all occurs in a controlled setting that prevents the student from getting lost in the system.

• Customization: No two students have the same needs. With computer-based training, no two students will have exactly the same learning experience. The computer is able to respond with helps, branching and reviews as required.

• Speed: The most-used characteristics of the software can be taught in a matter of minutes or hours.

• Convenience: Training can conform to the student's time schedule.

• Cost: Computer-based training is easy on the budget.

• Success: There is less chance the student will be seriously frustrated because computer-based training controls the learning experience. Many educators also believe computer-based training produces a higher rate of retention than other presentation formats.

Presently, computer-based training is just gaining a foothold in the business arena. According to company representatives, if you purchase an office system from Wang Laboratories, Inc. or a Displaywriter from IBM, your training alternatives will be limited to classroom training or self-instructional manuals. IBM does have computer-based training available for some of its other office products. Both companies use the computer to assist in internal staff training.

OA alternatives involving personal computers offer more training choices. Several companies are de-

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veloping and marketing computer-based training for popular office packages such as Visicorp's Visicalc, Micropro's Wordstar, Xyquest, Inc.'s Easywriter II, Multiplan, Ashton Tate's Dbase II and others.

These training packages typically are offered for a purchase price in the neighborhood of $50 to $100 per course. Considering that most personal computers in the business environment represent a payout of $4,000 to $10,000, including software, a quick, sure way of learning to use the personal computer is certainly worth the investment.

One of the first questions users ask about software is whether to make or buy it. If the training you seek is available in CBT form, I'd emphatically recommend buying it; in terms of both hard dollars and labor, it will be less expensive. Before buying, you should ask yourself the following questions:

- Is the it easy to use? You don't want to have to be trained to use the training.
- Does it teach what it says it will teach?
- Is it compatible with your hardware?
- Is it engaging? Will it hold the learner's attention by means of graphics, varied activities and student involvement? Stay away from passive training that requires the user only to press the RETURN key. Questions, simulation and effective humor all keep involvement high.
- Does it use effective teaching methods? True/false and multiple-choice questions are good testing devices, but may not be the best ways to teach students how to use a software package. Simulation controlled by the computer can often give the student a more practical experience.
- Does it offer complete coverage? Don't be fooled into believing that spending less time in training means learning the subject thoroughly.
- What is the reputation of the company among its customers?
- Does the vendor provide telephone and on-site support services?

What do you do if computer-based training is not available for your particular need? If that need is large in scope, you may want to investigate the "make CBT" option. Before you dive in, take a close look at the cost in terms of time and money.

First, decide if your problem is suited to this kind of training. If it is, determine whether an authoring system is available. Using an authoring system means you design the training and input the data. The system then generates much of the computer code. Authoring systems can be costly. In addition, some authoring systems are prohibitive because the author essentially has to learn a complicated system language. Of course, CBT programs can be coded line by line, but I don't recommend this approach unless the time, money and programming talent are readily available.

"If your need is large in scope, you may want to investigate the 'make CBT' option. Before you dive in, take a close look at the cost."

Suppose your organization has a fairly complex customized correspondence/data base office system. Because of turnover and staff expansion, 20 people must be trained to use the system each month. That can add up to a lot of time in training or a lot of system misuse. If an IBM mainframe computer is part of the system, IBM's IIS authoring system might be an alternative. If you are using a configuration of Apple Computer, Inc. computers, Apple Pilot may be useful. Or, if you have a variety of personal computers, an authoring system like Coursemaster (Digital Research, Inc.'s CP/M-based) may meet your needs.

After identifying the means of creating the CBT, you should then move on to costing out the project, including the labor and time involved, the hardware and software needed for course development and the cost of duplicating the CBT training to make it available for many users.

The importance of technology to organizations is growing; the popularity of computer-based training seems likely to grow along with it. OA

Barnes, West Coast manager, telecommutes from Tucson, Ariz., to Deltak Microsystems, Inc. in Naperville, Ill. Deltak Microsystems offers computer-based training on a variety of OA and computer-related topics.

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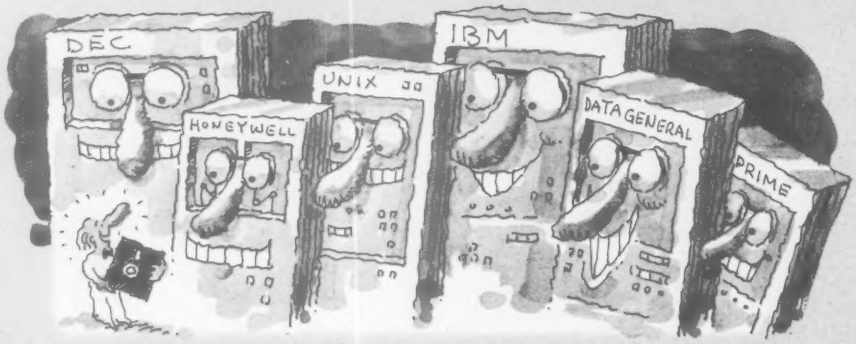

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Working Remotely:

Where Will Your Office Be?

Reporting to work may soon mean staying at home or walking to the nearest resource center.

By Glenn Rifkin

ILLUSTRATION BY KATHARINE MAHONEY

In the warm spring of a not-too-distant year, a white-collar worker awakes, dresses, eats and steps out of the house into the suburban sun. Instead of climbing into the car and joining the frenzied rush-hour snarl, this worker walks several blocks to an unassuming building within his neighborhood. Up two flights of stairs, he turns into a long corridor with endless doorways. Coming to one, he enters.

In the small work space, there is a desk, a videophone and a small unobtrusive portable computer folded like a briefcase. After a quick stop at the coffee machine, the worker sits down and begins his day as workers in rooms on either side begin similar days with similar equipment. The single difference is that all three workers are employed by different organizations and their jobs have nothing in common.

The building is a remote work site, a neighborhood work center, and the scenario is office automation taken to its extreme. The onset of telecommunications has brought into question the entire concept of today's office. Will it truly be necessary for all the workers of any organization to be situated within the same walls of a central location? Or will the quest for productivity spawn networks of remote work sites organized to get the maximum efficiency out of the white-collar work force?

The "electronic cottage" concept was presented by Alvin Toffler in *The Third Wave*, his best-selling view of the information age. With

the rapid advances in computer technology, he pointed out, workers would be able to stay at home to complete their designated tasks.

Many organizations — among them Mountain Bell of Colorado, Control Data Corp. of Minnesota and The First Continental Bank of Illinois — have instituted small pilot projects allowing employees to work at home.

Michael J. Murphy, Mountain Bell's staff specialist in Unix training, has worked at home at least three days per week for the past three years. A pilot program, initiated in 1980 by the company's Human Resources Department, allowed a group of 20 to 25 course developers and programmers to telecommunicate from home on a regular basis.

"Everyone who worked at home experienced an increase in productivity by a factor of anywhere from 50% to 150%," Murphy noted. The increase was attributed to a lack of interruptions, shorter lunches and a more fluid distraction-free environment.

And he cited other benefits: "It's almost like a raise. The money saved on the commute and clothes and other hidden costs are a real benefit. The company's willingness to allow this has also made me feel a lot better about being an employee."

Though Toffler makes a persuasive argument for "home work," other proponents of telecommuting and remote working believe the future holds more than just working at home. They envision neighborhood office centers (much like local grammar schools) or satellite work centers as replacements for large urban office complexes housing virtually all of a company's equipment and employees.

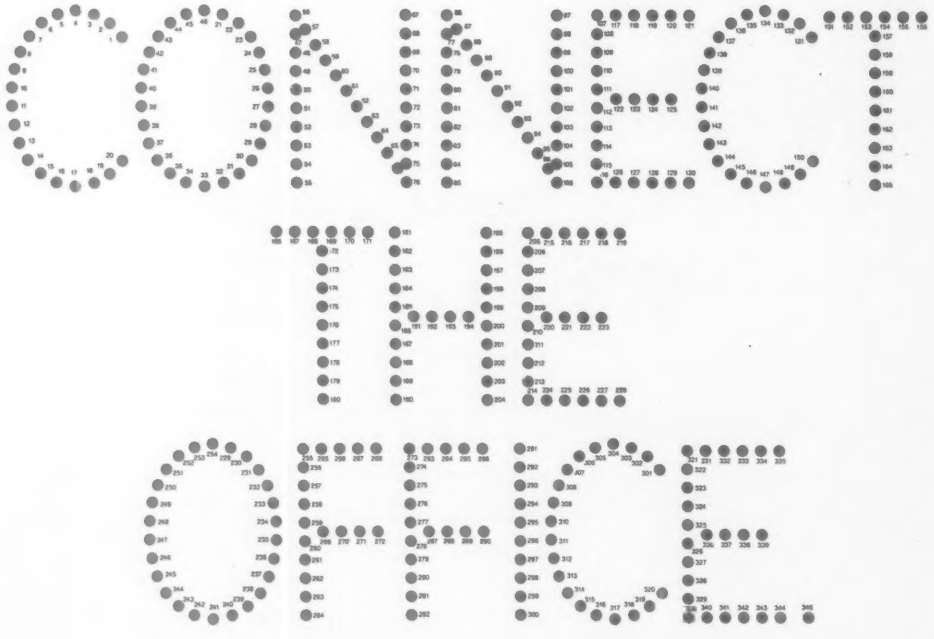
Whatever the futurist's view, a Pandora's box has been opened, and it brings into question the very core of the value system of basic working life, for both organizations and individuals.

Working remotely is nothing new for some professionals. Writers, accountants, artists and other self-employed professionals have traditionally conducted business from their homes. The effect of working remotely on a member of a business organization, however, is another matter, with its own set of pitfalls.

Professor Margrethe Olson of the New York University Graduate School of Business Administration has studied remote office work extensively. She believes our society has set up a distinction between work and nonwork life, and a shift in that trend would create stress: "In life we learn to go to work and come home from work. There is a clear distinction between the two." According to Olson, if people begin to work and live at the same place, "things will get mixed up and cause stressful reactions. That is one of the strong arguments against work at home."

She pointed out, however, that "office automation provides the potential to alter the locational and temporal definition of large numbers of office jobs. The term 'telecommuting,' for instance, refers to the substitution of communications capabilities for travel to a central work location. OA technology permits many office workers to be potential 'telecommuters' in that their work can be performed remotely with computer and communications support."

In addition to work at home, two other options are frequently mentioned: satellite work centers, in which a self-contained organization would physically relocate divisions to outlying areas closer to employees' homes, and neighborhood work centers, which would allow employees from different



organizations to share space and equipment in the work center closest to their homes.

The application of remote work, currently in its infancy, raises a number of key issues;

- At what point is the technology sufficiently in place to allow widespread telecommuting?
- How will a manager supervise remote workers?
- How will productivity be measured?
- What are the psychological implications of removing a worker from the traditional social setting of the office?
- How does remote work affect the employee's relationship with his peers and his loyalty to the organization?
- What are the trade-offs for the organization and for the individual?
- At what point do telecommuting costs benefit a company more than the presence of all of its employees?

Unlike many areas of OA, the removal of a worker from the office is viewed as a radical departure from the norm and, therefore, difficult to institute. Many researchers refuse to advocate the idea until several questions are answered. In addition, some cite the success of the traditional office structure and question the need for remote workers at all.

Nevertheless, a host of potential benefits seem possible for both the organization and the worker. A major consideration is the ever-increasing cost of commuting. Spiraling energy costs, coupled with overworked, antiquated mass transit systems, have placed a serious burden on today's commuter.

Toffler points out that the economic trade-off between transportation and telecommuting is a significant one: "The escalating costs of commuting are borne by the individual workers. But they are, of course, indirectly passed on to the employer in the form of higher wage costs and to the consumer in higher prices."

Toffler cited a 1973 study done by Jack Nilles of the University of Southern California for the National Science Foundation. Nilles studied 2,048 insurance company workers in Los Angeles and found that each person traveled an average of 21.4 miles a day to and from work. "All told, the workers drove 12.4 million miles each year to get to work, using nearly a half-century's worth of hours to do so," the report stated. Nilles told *Computerworld OA* that the figures in the report remain accurate (or even higher) in 1983 numbers.

According to the study, the company was bearing the enormous commuting costs — approximately $520 per worker per year — plus other costs of the centralized location. Toffler asked "When will the cost of installing and operating telecommunications equipment fall below the present cost of commuting? While gasoline and other transport costs are soaring everywhere, the price of telecommunications is shrinking spectacularly."

In 1977, Richard C. Harkness did a study, "Technology Assessment of Telecommunications/Transportation Interactions," for Stanford Research Institute International. Harkness pointed out that "if 50% of all office workers worked in or near their homes six out of every seven working days, the savings in fuel consumption from reduced commuting would be about 240,000 barrels of gasoline daily in 1985."

Another major concern that focuses corporate attention on remote work sites is the astronomical cost of office space in the nations's urban centers. Costs of $100 per square foot and up (as high as $1,900 per square foot in one Manhattan office building) have made com-

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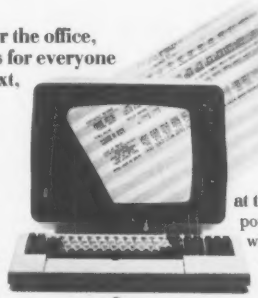

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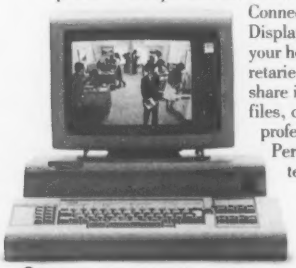

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panies rethink their long-range plans: Wouldn't suburban office centers, in significantly lower rental areas, make economic sense if workers can be tied electronically to the home office?

Telecommuting has also presented an alternative to the thorny issue of employee transfers. Harkness, currently a senior strategic planner for Satellite Business Systems in McLean, Va., pointed out that the cost for relocating an employee can be as much as $26,000. For large corporations that transfer many employees during the course of a year, Harkness asked, "Do we uproot and transfer an employee or do we make him a remote worker, give him teleconferencing capabilities for a couple hours per day, and let him stay where he is?"

Flexible work arrangements, according to Olson, are an additional benefit for remote workers. Such arrangements as flex-time and job-sharing are made more viable with telecommuting, thus allowing for easier child-care provisions for the working parent.

All the potential benefits, however, must be viewed within the big picture of today's corporate structure. For the organization, the employee must remain both a productive and interactive member of the group in order to be of the most value. For the worker, the very concept of professional life is based on a string of time-honored notions about being a member of the group — ideas that will be tested in the remote site.

"Social isolation was a key issue with all the people we interviewed for our study," Olson said. "Those who felt the most socially isolated when working at home, for instance, were those for whom it was a trade-off. If they couldn't be at home to raise the children, they couldn't work at all."

"It's too soon to have a blanket answer as to what the psychological effects will be," according to Dr. Paul G. Ronco, president of Man-Tech, Inc., a Reading, Mass., research and consulting firm specializing in industrial psychology. "Isolation, the lack of social interaction, the lack of feedback will dictate the need for some provision for interaction on a regular basis. A whole range of human factor problems as well as personality issues come into play. You simply can't put someone away in some isolated location without deleterious effects."

The idea of neighborhood office centers, located throughout suburban areas, is designed to provide the remote worker with the best of both worlds. It does away with the long commute and provides a social office setting in which the worker can interact with others on a daily basis. Olson is skeptical, however, that the concept can, in reality, be totally effective. "The neighborhood work center gets you out of the house, but in a situation where you have a lot of people doing unrelated things for unrelated organizations, you won't get the camaraderie or learning experience that professional peers must have for professional development. It would be like going to the supermarket to get your socialization."

"Do we uproot and transfer an employee or do we give him teleconferencing capabilities for a couple of hours a day and let him stay where he is?"

If corporations are willing to finance the construction, the most plausible solution may be satellite work centers. These will address the commuting problem (to some extent) and allow for the desired on-site social and corporate interaction. Several large New York banks have already opened satellite sites on Long Island.

Harkness said he believes the increases or decreases in productivity are impossible to measure in relation to remote work sites until more are in place. However, the traditional office setting leaves a lot to be desired: "While we're going through school, we're told to go off to the library to get work done. Then we graduate and join corporate environments where there is lots of noise. You leave your door open and you never get anything done. When you really want to get something done, you have to go off alone somewhere.

"There's a right time to be alone and concentrate and a right time for communication and input. The current office is strong on one and weak on the other. It is by no means clear that productivity would go down if you leave people on their own to get work done. It might increase it."

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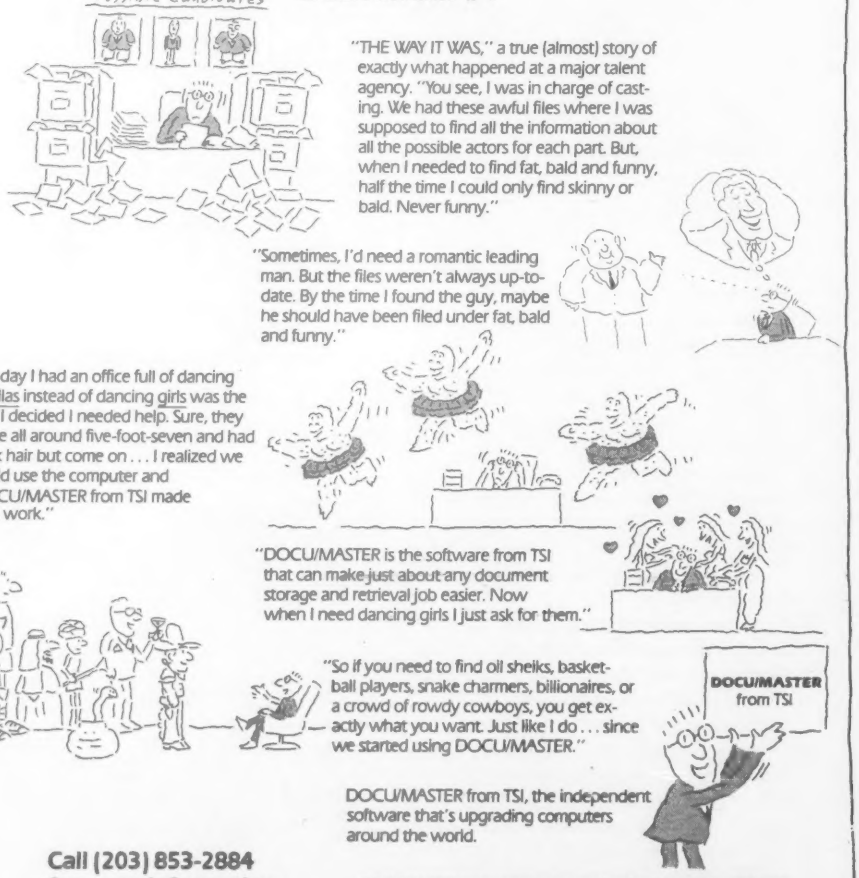
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Personal Computers? Micros? Desktops? Call them what you will, they are all integral parts of your OA strategy. The personal computer phenomenon must be analyzed and tracked if it is to be used effectively. In the next OA Focus section of *Computerworld OA*, we'll examine how personal computers will affect new and experienced computer users, their work habits and staff requirements. We'll look at management strategies, user experiences and key product offerings. Users who have lived through the process will suggest methods to tie personal computers into a total organizational network or to keep them as personal data bases. And, we'll have an update on information centers.

In this issue, we'll also have an interview with author Alvin Toffler as well as articles on subjects such as information systems, measuring productivity, data base management systems and a productivity study on electronic mail.

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Networking at Rank Xerox

Rank Xerox, Xerox Corp.'s international subsidiary headquartered in London, has initiated an innovative approach to remote working. Instead of large staffs of full-time employees housed in Xerox facilities, "networkers" — full-time consultants hired for specific projects — work in their homes or at other remote sites.

Rank Xerox felt that "salaries and numbers of employees are generally under our own control. Their major contrasting feature is that they have the prospect of producing some added value for the organization they serve — our buildings have not."

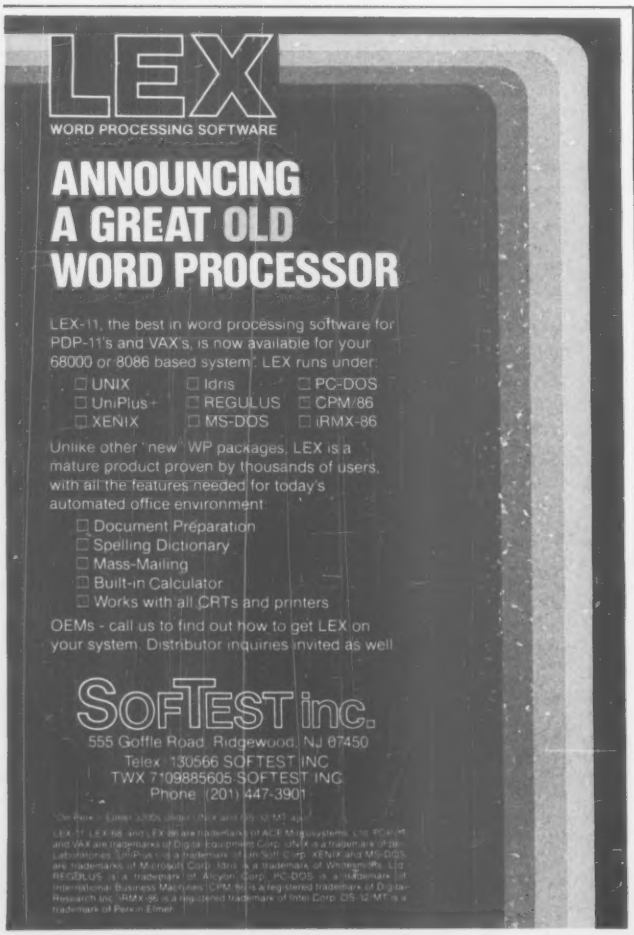
Facility costs such as rent, taxes, light, heat and security were beyond corporate control, and with these taken into account, the true cost of an employee with a salary of $30,000 became nearly $80,000, the firm said. In his official report on networking, Dr. David West, manager of Rank Xerox International Personnel asks, "Does the cost of running an office building for *all* staff *all* the time justify the supposed benefits of insisting that everyone is physically present in that building on every possible occasion?"

To maintain the "valuable" portion of total costs (manpower) while reducing costs for facilities, Rank Xerox proposed breaking the organization into two types of staffs:

- Core staff: a radically reduced number of full-time salaried employees who exist not only to achieve certain objectives, but also to maintain day-to-day management and continuity. They will also manage the "networkers."
- Networkers: a loosely interaffiliated group of workers who only rarely or never work on Xerox premises; are typically oriented toward defined objectives, projects, or time-defined activities; and make a significant knowledge input to those activities. While part of the Xerox "family," networkers would formally be self-employed consultants. As such, they would not be eligible for company benefits, but could offer their services to other organizations. They would be linked to the company by a CRT-based "mailbox" system suited to the Xerox 820 or the Star system.

West's report said many Xerox office tasks could be performed outside the office or that, at most, physical attendance was necessary only on a part-time basis. However, the report did express particular concern about the psychological risks of networking and urged that these workers be made to feel a strong "sense of belonging" to the Xerox family.

West, who has overseen the institution of networking on a small scale, concluded that "The Office of the Future may very well not be an office and is certainly not very futuristic. The technology has been available — at a price — for some time; the only novelty of the 1980s will be its lower cost and widespread application. Introduction of its hardware in constrained times can be a bloody battle with unionized white-collar labor to cut costs. Or it can, by a more perceptive look at what costs actually comprise, be a movement toward a totally different method of organizing work, in which the only sufferers are likely to be the property developers and owners of large office blocks."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known in looking at remote working and telecommuting. The work will get done, one way or the other, Harkness pointed out, but is there enough ego reward in working alone? "For many professional workers, the visibility within the office is a key to getting ahead. Many are going to be reluctant to give that up."

Linda O'Keeffe, a contributing editor to the Seybold Report, was willing to give up a position in a major financial institution with 7,000 employees to become a remote worker for the Philadelphia-based Seybold Consulting Group. She works in a four-story Phoenix office building in which a series of single-person offices accommodate workers from different organizations. With an IBM Personal Computer and the Infomedia Corp. Computer Conference System of electronic mail linking her to her employer, O'Keeffe is one of several telecommuters geographically dispersed around the country for Seybold. "This is new for me, but I love it. I could not have made the transition from the large bank to working at home. This way, I still go to the office, but I am on my own. It gives me a familiar environment; I can send my work to Philadelphia via electronic mail, and it gets redistributed there to whoever needs it." She said assignment deadlines are a built-in monitoring system for her work. "There's no supervision in the sense that someone is watching me work. But I'm measured by the results I produce."

Monitoring remote workers is perhaps the most precarious part of the telecommuting scenario. Because the general idea is that the employee does not have to be in any one place to get the job done, the ability to supervise and watch over that employee is all the more difficult. "That is the negative side to remote working. How can I monitor the remote employee? Is supervision only a matter of the results they produce, or will I need to monitor them invisibly, through their terminal, for instance? That, of course, conjures up images of Big Brother," Olson said.

In preparing her study "Remote Office Work: Changing Work Patterns in Space and Time," Olson (in collaboration with the Diebold Automated Office Program) interviewed 32 remote workers and their managers. The workers performed either clerical or technical jobs such as data entry or software engineering and were equipped with the electronic tools necessary to complete their work at home. The workers she interviewed either preferred to work at home or did so because of other responsibilities or constraints. According to Olson, they were:

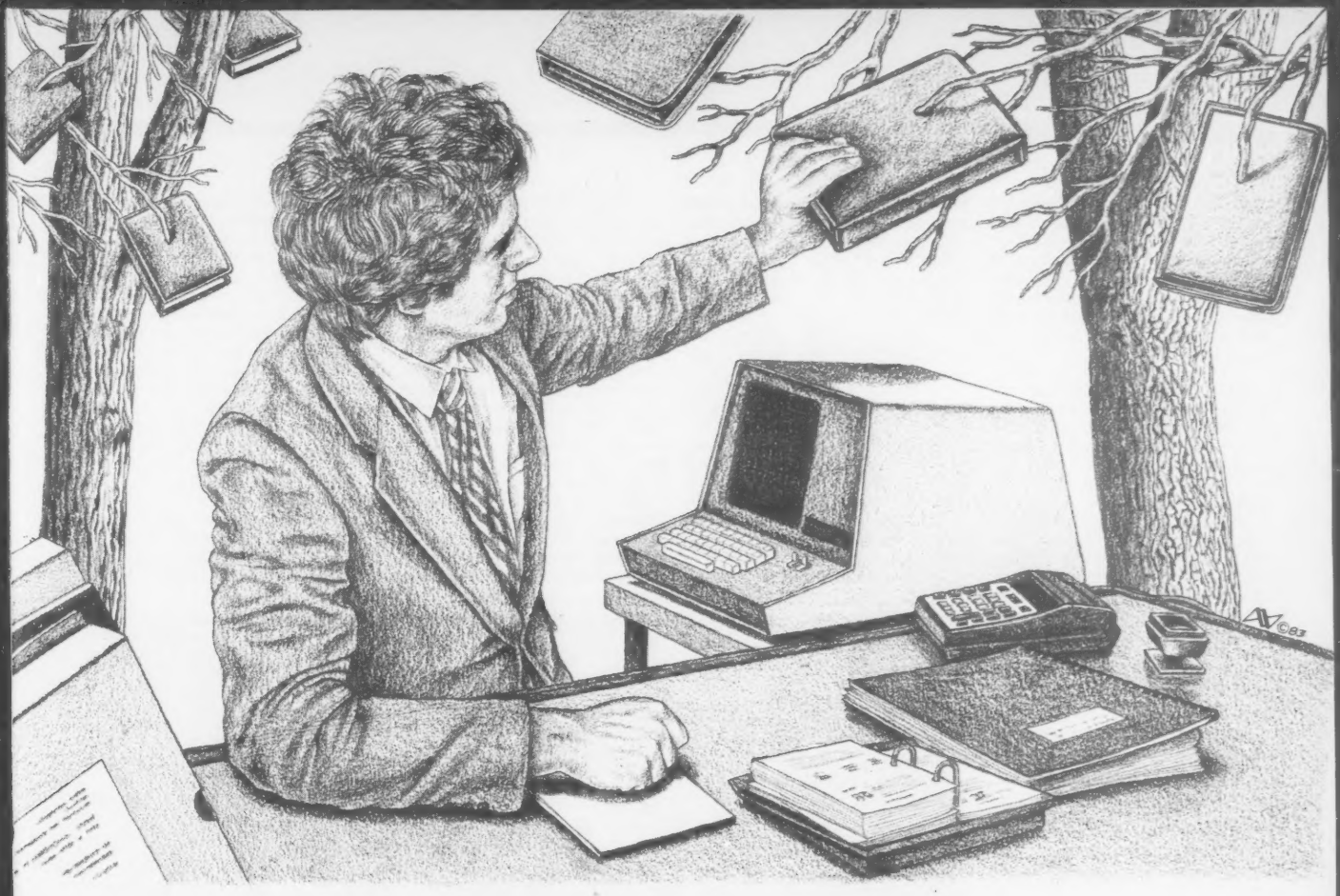
- Self-motivated and self-disciplined.
- Had skills that provided bargaining power with employers.
- Had family requirements that required work at home.
- Had few social contacts beyond work and family.

Olson also discovered that "the managers relied heavily on mutual trust and respect in their relations with their employees. Having measurable results and, if possible, milestones built into the job made remote management much easier. And, the availability of open communications at all times was seen as critical; remote workers needed to be easy to reach within a reasonable amount of time."

The idea of a nationwide landscape of urban ghost towns surrounded by vast networks of remote work sites and electronic cottages is clearly premature (if not just science fiction). However, those who have explored remote work sites agree changes are in the wind. "After all the pros and cons, I believe work at home is going to be a relatively small phenomenon. I do feel that decentralization will be widespread, however," Olson said. "There won't be any unilateral move to have everyone work at home," Harkness agreed. "But there will be a redistribution of how things are done. There will be some at home, some at neighborhood work centers and some remaining in the office."

Olson added that more support is needed for the remote worker. "Before you can talk about anything else, the whole organization must at least be hooked to electronic mail. There is nothing that can't be done right now, but it hasn't yet been packaged to meet the remote worker's needs." OA

Rifkin is a staff writer for Computerworld OA.



Picking Software For Office Integration

In analyzing system needs, users should first look long and hard at software capabilities.

By George Morrow

ILLUSTRATION BY ALAN WITSCHONKE

Office automation buying decisions are becoming increasingly more complex as users are faced with choosing not only from an incredible array of product capabilities, but also from a wide range of prices.

Although price is, of course, important, it should not be the only — or even the major — consideration. First, because of the old rule that you get what you pay for. And second, because buying for price alone ignores some critical issues that may influence a product's long-term needs.

Along with price, the product under consideration should be evaluated in terms of three major areas: software, hardware and communication. And although it may sound strange coming from a hardware designer, the best advice I can give is that the buyer should choose software first. This will be the toughest decision to make; software is much more complex than hardware.

The first choice the user will face is whether to pick off-the-shelf or custom software. In most cases, off-the-shelf software is the better choice because of its proven track record. Designed to meet the needs of many users, off-the-shelf (or packaged) software is being developed and updated constantly. In addition, it's much less expensive than custom software.

Custom packages, on the other hand, have many drawbacks. Developed by or for a specific user for a specific purpose, this type of software seldom precisely fits its intended purpose. For example, let's take an accounting package. Because a programmer and an accountant don't have the same mindsets, problems are inevitable. The programmer knows how to talk to a computer, but probably doesn't understand accounting practices. The accountant knows what he wants the computer to do, but not how to tell the computer to do it.

Although the accountant will tell the programmer exactly what he wants, the programmer will hear those requests and interpret them according to his own background. The result is that the accountant will get only an approximation of

what he wants. A case in point is Visicorp's Visicalc, the most successful financial spreadsheet on the market. Visicalc was written not by a programmer, but by a Harvard M.B.A. student who got tired of doing business plans over and over again.

Another problem with custom software is its cost. Programmers don't work cheap, and the user finds himself paying for the program before a working product exists. Programmers can be compared to rock stars. Once they have a hit (or a best-selling software package), you can't get them back in the studio. The difference is that with rock stars, the buyer hears the record and decides he likes it before he pays for it. The programmer, however, may take six months to tune his instrument, and the buyer is paying the whole time. Worse yet, there's no guarantee the finished product will be what the buyer intended.

"Some packages on the market today can be considered universal software, running in a wide variety of hardware environments."

Another critical choice the user faces in buying a computer system is its operating system. Even though some might argue that Unix is a better operating system than Digital Research, Inc.'s CP/M, a CP/M-based system could be a more intelligent choice. Because the CP/M is a de facto standard, thousands of applications packages are available to run on it. That alone makes it the best buy for the money.

Software for office use falls into six main application areas: word processing, financial spreadsheets, data base management systems, communications, graphics and accounting. WP software, the most common application, lets the user type a document and make any number of modifications before printing out final copy. Typical features include editing, formatting, global searching, column alignment, print enhancements, document merging and spelling checkers.

Financial spreadsheets are simply columnar work sheets that let the user manipulate data electronically. A matrix of user-designated columns and rows, a spreadsheet allows the user to change data in a particular column and the software automatically changes the data in any other columns affected by the original change.

Data base management software gives the user an electronic filing system. The user can collect related and diverse pieces of information in one spot, manipulate the information in any way and recall it in any form. The system takes care of overhead details while letting the user look at the different aspects of each record.

A communications package sends and receives information electronically by means of telephone lines and a modem. The software lets the user receive information at his own terminal, where it can be displayed, printed or saved for future use. Applications for communications software range from electronic mail to research using data bases available from outside sources.

Graphics software allows a user to analyze data graphically — for example, in the form of pie charts or graphs "drawn" on the terminal's display screen. The graphics can be viewed on the screen or reproduced in a variety of hard-copy alternatives, such as paper, 35mm slides or photographs.

The last major software function is accounting. This type of software gives users the necessary tools to handle a business' day-to-day operations, such as accounts receivable and payable, order entry, invoicing and general ledger accounting.

Some of the packages on the market today can be considered universal software, such as Wordstar and Visicalc. They run in a wide variety of hardware environments, increasing software productivity because the programmer doesn't have to reinvent the wheel for each new machine.

The availability of universal software has led to another phenomenon — bundling software with hardware. As recently as three years ago, bundling software would not have been possible. Now a potential user can go into a computer store and, before he makes his purchase, get a demonstration of a complete system and actually see what it can do. Before, all he could see was a piece of hardware.

So far, all the software discussed comes in individual packages. Now we're beginning to see some new entries on the market

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— what I call "seamless" software. Seamless software takes three or four different applications and merges them together so closely that moving from one application to another is like shuffling paper on a desk. Packages currently available integrate WP, financial spreadsheets and data base managers; the user can shift from looking at a spreadsheet to looking at a report based on the spreadsheet, as if he'd simply flipped from one page to another.

Hardware selection should become a consideration only after a software choice has been made because the complexity of the software will determine the appropriate hardware. The more exotic the user's needs, the more expensive the hardware will be.

Choosing hardware without being wasteful is difficult. At some point, the user may have to throw something away because the system can grow only so far. The user's only interest in the CPU should be whether or not his software will run on it. Memory and peripherals, however, are much more important because they will determine how much can be done and how long it will take to do it.

Factors to consider include:

• Are primary and secondary storage adequate for the complexity of the software? Large data files and spreadsheets can quickly eat up memory.

• Are floppy disks sufficient or is a hard disk required? To manipulate large amounts of data, a hard disk, more memory or both might be necessary.

• Is concurrent processing important? Will the user need to generate reports while handling other functions?

• What type of printer is required? For correspondence, the user will want a letter-quality printer; for in-house requirements, one may not be necessary.

• Is a modem necessary? Electronic mail or access to public and proprietary data bases demand a modem.

• What are the graphics requirements? The user must determine whether he needs bit-map graphics capabilities, a color printer, hard-copy peripherals and the like.

Communication between computers — a network — is the final consideration. The absence of a networking standard makes this issue particularly confusing. Networking standards have been the subject of a great deal of discussion, but, so far, everyone is doing his own thing. This is upsetting because standards in communications are even more important than standards in hardware and software. The lack of standards for communicating between different pieces of hardware limits our selection of both hardware and software. It breeds confusion and limits growth because no one knows where to turn.

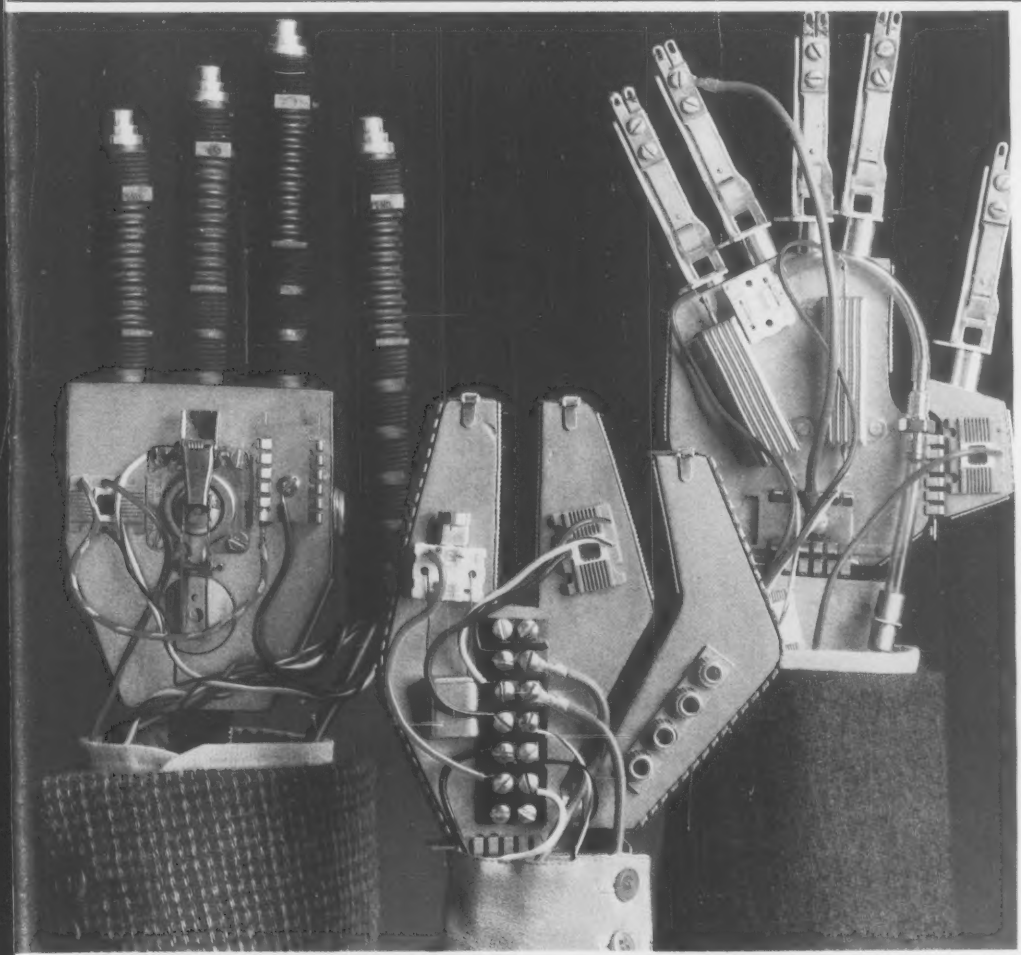
Ethernet — the only viable networking plan being discussed now — is horribly expensive, especially in the environment of low-cost microcomputers. For example, suppose a user has five microcomputers, each costing $2,000, that he wants to connect over a network. With Ethernet as that network, the cost would be between $30,000 and $40,000.

"Hardware selection should become a consideration only after a software choice has been made."

Three things must happen before a network can be named a standard: a protocol, or method, for getting on and off the network must be established; hardware must be available to implement the protocol; and a network interface to the computer system must be developed. The first of these — agreeing on a protocol — is the most difficult to accomplish, although progress was made when 13 companies endorsed an Ethernet-type protocol last December. But that was only the first step, and several problems still remain. For example, it seems likely people will wait for an IBM announcement before committing to any standard. Furthermore, low-cost hardware for Ethernet may be two or three years away.

Networking still has a way to go. We may soon hear some things that will set our industry on its ear, but networking has not yet come of age. For right now, carrying a floppy disk from one computer to another is probably still the most effective way to transfer information.♦ OA

Morrow is president of Morrow Designs, Inc., a hardware vendor in San Leandro, Calif.



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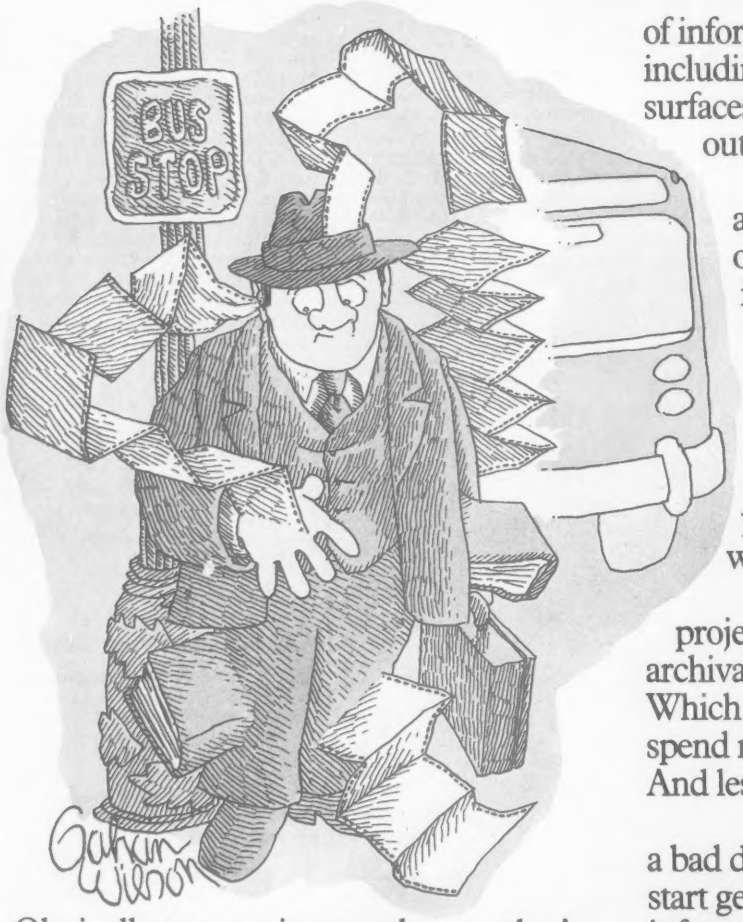
Funny how programming grows on you.



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OA Has a Friend At Chase Manhattan

Chase Manhattan is investing in office automation and is expecting a high return on that investment.

By Glenn Rifkin

Near the tip of Manhattan, in the heart of the world's financial center, the French artist Dubuffet's massive sculpture, "Trees," sits in the shadows of the Chase Manhattan Bank Building. These trees, however, neither sway in the swirling breezes of Wall Street nor change with the seasons. The sculpture is solid and secure and unyielding, much like the organization it adorns.

Although conservative by nature, Chase Manhattan has made a commitment to grow and change in one particular area — office automation. The 184-year-old bank, third largest in the country, has taken a giant step toward the office of the future.

Chase, a vast international financial institution with nearly $81 billion in assets, 36,000 employees, more than 300 branches, 50 major subsidiaries and 6,000 correspondent banks, has already spent $25 million on its foray into OA. It has committed nearly $15 million in that direction for 1983.

PHOTO BY G. RIFKIN

Although Chase began a major commitment to word processing using the Wang Laboratories, Inc.'s OIS line in 1979, the first serious thrust toward OA got under way two years ago with the formation of a proficient OA staff. Headed by Senior Vice-President Elaine Bond, who serves as director of corporate systems, the department includes a staff of technical strategies officers with expertise in all areas of OA.

Jerry Lambo, vice-president for office automation, technical strategy and security, was assigned the task of creating an OA strategy for Chase Manhattan. The strategy was approved in late 1982 by Chase President Thomas G. Labrecque and was set in motion under the direction of an OA Coordinating Committee. The coordinating committee, made up of five corporate executives, was later expanded to a 10-member steering committee.

In the strategy, completed in October 1982, the OA developers stated a clear goal: "Office automation is a means to an end — the end being a streamlined and improved business environment. People, information and equipment are clearly the core resources for Chase office work."

The first concern for the automators was handling the issue of centralized vs. decentralized decision making. "We had to control the momentum," Lambo said. "Chase was clearly committed to OA, but we had to decide whether centralized or decentralized planning, or a mixture of both, was the best route to take."

In order to best initiate the desired capabilities, the OA steering group recommended an innovative tier-system approach to implementation. Rather than have a central, all-knowing body dictating companywide OA policy, Chase sought direct involvement of the individuals who would be affected by the automation of their departments. The tier system helps define the effect of a particular program on the organization and the requirements for getting that program implemented. The structure includes:

- Tier 1. Programs that require a corporatewide strategy and a corporate-level implementation.
- Tier 2. Programs that require a corporatewide strategy, but are implemented at the sector level — for example, access arrangements to data bases.
- Tier 3. Programs that require only corporate standards and guidelines, while the strategic plans and their implementation are to be accomplished independently by the sectors — for example, professional workstations.

In this fashion, explained Ricci Anderson, vice-president of office automation and technical strategies, a variety of levels of working groups can get involved and have meaningful input into OA decisions. "We can take a group, discuss pilot programs and make recommendations and then bring the group to a higher level. In some cases, approval is needed on a senior level to implement an idea, but in other cases, the ultimate decision rests with the working group or the subcommittee of the steering group."

The OA committee suggested several goal areas they considered to be pivotal. Among them were interpersonal communications; executive, professional and administrative support; environmental and human factors concerns; and networking access.

According to Anderson, Chase is active in all areas of OA — from WP to videoconferencing. Some programs are well in place; others are being implemented or planned. Each program is coordinated by an individual who reports his progress to the OA steering committee on a regular basis. Ralph Verdino, second vice-president in charge of microcomputers, pointed out, "we don't dictate policy from a central committee; we advise, much like an information center. We discuss the business need and determine if what the individual wants to do is feasible, and if it also satisfies the corporate need."

According to the OA strategy report, Chase has emphasized programs that "provide the earliest productivity gains. While these are very much user-dependent, initially they are likely to be the expansion of administrative support, the development of a pervasive electronic mail system and the tailoring of executive support to unique business needs."

With worldwide operations in 100 countries from the Soviet Union to Malaysia, Chase has also created an extensive overseas OA program. An installed network of the Wang VS system connects most of the foreign offices with New York in various forms of electronic mail. Such time-consuming tasks as the corporation's facility reporting system or the personnel tracking system have been reduced to quick computer-aided functions.

"We developed a personnel tracking system," said Steve Rickert, second vice-president in charge of international OA, "so that if a senior executive wants to

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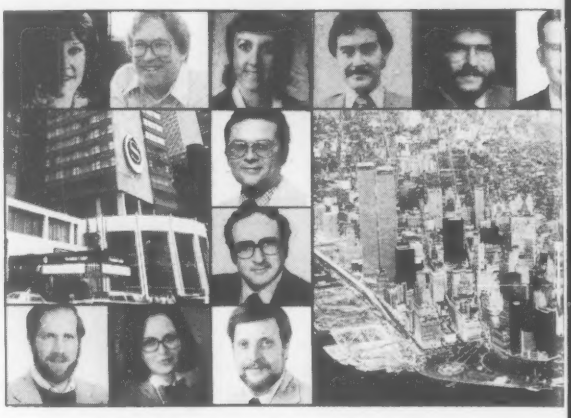

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The Conference Program

Thursday, June 23 & Friday, June 24

The Thursday and Friday conference program is divided into four major "tracks," but you are not required to sign up for a particular group of sessions. You may select the sessions you need from any of the 48 sessions available and create a conference program designed to suit your unique information needs. You may even choose to attend one day instead of two if you want. A detailed agenda will be sent to you prior to the conference for your advance planning, so you don't waste a minute!

Special General Session for Thursday Attendees:

The Revolt of the Masses: Micros and the Changing Role of DP. *(5:00-6:00 p.m.)*
Dr. Michael Hammer, President, Hammer & Company

1. Personal Computing in a Corporate Environment

For Executives in large corporations who are involved in using micros in distributed data processing or as standalone executive workstations, the EMCE conference program includes:

Keynote: Increasing Corporate Productivity via the Personal Computer *(Thurs., 9:00-10:00 a.m.)*
Mayford Roark, Executive Director of Systems, Ford Motor Company

The Executive/Professional Workstation *(Thurs., 10:00-11:00 a.m.)*
Evelyn Wilk, Consultant, Arthur Andersen & Co.

DDP with Microcomputers *(Thurs., 2:00-3:30 p.m.)*
Moderator: Jerrold Eisen, President, Office Sciences International
Panelists: Phil Dixon, MIS Manager, Apple Computer; Robert A. Miller, Special Assistant to the Deputy Secretary of Treasury, U.S. Treasury Department

The Information Resource Center *(Friday, 3:45-5:15 p.m.)*
Moderator: Thomas Kosnick, Researcher, Stanford Business School;
Panelist: Alan Gross, Director of Systems, International Paper Company

The Role of Apple and IBM in Corporate Computing *(Friday, 3:45-5:00 p.m.)*
Moderator: David Bunnell, Publisher, "PC World"

New Issues of Confidentiality and Security in Organizational Information Processing *(Friday, 9:00-10:00 a.m.)*
Professor Alan F. Westin, Columbia University

Personal Computer Acquisition and Implementation Strategies *(Friday, 10:00-11:00 a.m.)*
Don L. Eddy, Principal, Office Futures Now, Inc.

Compatible Systems and Software for the IBM PC *(Friday, 2:00-3:30 p.m.)*
Moderator: Steve Cook, Technical Editor, "PC World"
Panelists: Chris Larson, Product Marketing Manager, MS/DOS, MicroSoft; Steve Flannigan, VP Software, Compaq Computer Corp.

2. Introduction to Microcomputing and its Applications

For Executives who are concerned with the selection and use of microcomputers primarily in smaller businesses, the EMCE conference highlights:

Keynote: The Personal Computer: The Mouse that Roared! *(Thurs., 9:00-10:00 a.m.)*
Lew Kornfeld, Director, Tandy Corporation

How to Buy a Personal Computer *(Thurs., 10:00-11:00 a.m.)*
Lawrence Govoni, Director, Govoni Microcomputer Training School, Boston, MA

Spread Sheet/Financial Applications *(Thurs., 2:00-3:30 p.m.)*
Moderator: Hannah Blank, Vice President-MIS, Chase Manhattan Bank
Panelists: Seneel Kelkar, Mktg. Mgr., Standalone Products, VisiCorp; Russell Warner, Product Mktg. Mgr., End user Products, MicroSoft

New and Future Trends in Personal Computing *(Thurs., 3:45-5:00 p.m.)*
John C. Dvorak, Editor, "InfoWorld"

Word Processing Packages for Personal Computers *(Friday, 9:00-10:00 a.m.)*
Susan Harmon, President, Transitions

DBMS on Personal Computers *(Friday, 10:00-11:00 a.m.)*
Adam Green, President, SoftwareBanc

A Look at Integrated Software Packages *(Friday, 2:00- 3:30 p.m.)*
Moderator: Dan Coursey, Sr. Market Analyst, International Data Corporation
Panelists: Chris Morgan, VP, Communications, Lotus Development Corp.; Brian Fischer, Sr. Vice President, Context Management Corp.; Roy Folk, OEM Customer Mktg. Mgr., VisiCorp

Panel: Executive Personal Computer Success *(Friday, 3:45-5:15 p.m.)*
Moderator: Alan Sneider, Partner, Laventhol & Horwath

3. Technological Developments in Personal Computing

For Executives who wish to keep up with changing microcomputer technologies in mass storage, business graphics, operating systems, and more, the EMCE conference highlights:

Keynote: The Future of Personal Computer Software for Business *(Thurs., 9:00-10:00 a.m.)*
Dan Fylstra, Chairman, VisiCorp

What's New in Peripherals *(Thurs., 10:00-11:00 a.m.)*
Peter Burgess, President, Burgess Management Associates

Developments in Personal Computer Business Graphics *(Thurs., 2:00-3:30 p.m.)*
Moderator: Dave Needle, Sr. Writer, "InfoWorld"

Developments in Mass Storage Capabilities *(Thurs., 3:45-5:00 p.m.)*
Moderator: Will Zachmann, VP, Office of Technology Assessment, International Data Corporation

Utilities *(Friday, 10:00-11:00 a.m.)*
Haines Gaffner, President, LINK

Popular Programming Languages *(Friday, 10:00-11:00 a.m.)*
Gordon Eubanks, Vice President, Commercial Systems Division, Digital Research, Inc.

Operating System Selection: 8 to 16 Bit *(Friday, 2:00- 3:30 p.m.)*
Moderator: Maggie Canon, Editor-in-Chief, "InfoWorld"
Panelists: Gordon Eubanks, VP-Commercial Systems, DRI; Jean Yates, President, Yates Ventures; Mark Ursino, OS Marketing Mgr., Microsoft Inc.; Natalie Shuttleworth, Manager of OS Mktg., Apple Computer

Developments in Networking *(Friday, 3:45-5:15 p.m.)*
Moderator: Will Zachmann, VP, Office of Technology Assessment, International Data Corporation
Panelists: Mark Stahlman, Dir., Mktg. Development, General Instrument Corp.; Art Simon, Director of Mktg., Commercial Services, Warner-Amex Cable Communications Inc.

4. Microcomputer Market Opportunities

For Entrepreneurs, Dealers, Distributors and Systems Houses, we'll offer sales and venture capital strategies you won't want to miss. Session highlights include:

Keynote: Retail Opportunities in the Personal Computer Marketplace *(Thurs., 9:00-10:00 a.m.)*
James Finke, President, Internetworx, Inc.

Software Packaging and Distribution *(Thurs., 10:00-11:00 a.m.)*
Will Luden, Director of Marketing and Retail Communications, Micropro International

Raising Venture Capital for Software and R&D *(Thurs., 2:00-3:30 p.m.)*
Moderator: Jim Furneaux, Partner, L.F. Rothschild, Unterberg, & Towbin

Legal Issues for the Retail Distributor *(Thurs., 3:45-5:00 p.m.)*
Walter Klasson, Brown, Raysman & Millstein

Market Update: Competition from Japan *(Friday, 10:00- 11:00 a.m.)*
Robert C. Wood, President, Robert Chapman Wood Company

Successful Training Strategies for Vendors and End Users *(Friday, 2:00-3:30 p.m.)*
Sue Cornwall, NEC Information Systems; Stephanie Rosenbaum, President, Tec-Ed

Delivering Good Maintenance, Service & Support *(Friday, 3:45-5:15 p.m.)*
John Harnett, Director of Planning and Development, TRW Customer Service Division

Selling the Corporate Account: Problems & Pitfalls *(Friday, 9:00-10:00 a.m.)*

Special Program for Educators

Saturday, June 25

Co-sponsored by T.H.E. Journal

For Educators and Administrators, EMCE will hold a special seminar on Saturday, June 25th entitled Microcomputers in Education which includes the following sessions designed to suit the unique needs of education:

Keynote: Computer Assisted Instruction in Education *(8:30-9:30 a.m.)*
Dr. Sylvia Charp, Editor-in-Chief, T.H.E. Journal

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The Executive Microcomputer Conference and Exposition (EMCE) is sponsored by the Conference Management Group of CW Communications/Inc., publishers of *Computerworld, InfoWorld, ISO WORLD,* and *PC World.*

Computer Funding and Acquisition *(9:30-10:30 a.m.)*
Ann Cullather, Education Legislation & Technology, Washington, D.C.

Logo: An Educational Language *(10:45-11:45 a.m.)*
Richard Carter, Director, Educational Laboratories, Lesley College

Teacher Training *(1:15-2:15 p.m.)*
Kevin Dwyer, Training Director, Unicom

Administrative Applications for Educational Institutions *(2:15-3:15 p.m.)*
Patricia Carter, Computer Applications Specialist, MASBO Co/Op

Educational Computing at Home *(3:30-5:00 p.m.)*
Moderator: Scott Mace, Sr. Editor, "InfoWorld"
Panelists: Ken Komoski, Executive Director, Educational Products Information Exchange Institute; Richard Robinson, President, Scholastic Inc.

Special Hands-On Workshop

Thursday, June 23 & Friday, June 24

In addition to the main conference program, EMCE will offer a two-day Executive Microcomputer Workshop for those professionals who wish to get hands-on experience with an Apple or IBM Personal Computer. The workshop will focus on four specific applications: spreadsheet analysis using VISICALC, data base management using dBase II, graphics and communications. An in-class network will be set up to demonstrate the communications capabilities of personal computers. The two-day seminar will run concurrently with the EMCE Conference program and will include admission to the exhibits and special feature sessions on Saturday, June 25.

The Executive Microcomputer Workshop will be sponsored by the *Personal Computer Learning Center of New York City* and will be held at the Center, located at 1120 Avenue of the Americas, on Thursday and Friday June 23 & 24th. **Enrollment is limited,** so please register early with your choice of hands-on using either an Apple or an IBM PC.

FREE Feature Sessions for All Saturday Attendees

FREE Special Feature Sessions for all Saturday EMCE attendees (exhibit or conference) will be held Saturday, June 25 from 9:00-1:00 p.m. The sessions will focus on professional applications for micros and starting your own home based business or office, and will also discuss the personal computer's impact on family life, kids and recreation.

1. The Home Office — Basics

Getting Started — Hardware & Where to Buy *(9:00-10:00 a.m.)*
Daniel P. Coursey, Senior Market Analyst, International Data Corp.

Software Applications — Selection & Uses *(10:00-11:00 a.m.)*
David Lamb, Sr. Research Associate, LINK

Setup & The First Six Months *(11:00 a.m.-12:00 noon)*
Paul Conover, President, Praxsys Communications

Programming Languages *(12:00 noon-1:00 p.m.)*
A. Richard Miller, Partner, Miller Microcomputer Services

2. Professional Applications

A Look at Spread Sheet Applications *(9:00-10:00 a.m.)*
Ralph Wagner, President, Microsource/Financial, Inc.

Investment Management Applications for Micro's *(10:00-11:00 a.m.)*
Jon Zonderman, Contributing Editor, "Computer Update"

On-line Data Base Systems *(11:00 a.m.-12:00 noon)*
Steven Sieck, Dir., Electronic Information Program, LINK

Word Processing Packages for Microcomputers *(12:00 noon-1:00 p.m.)*
Ronnie Marshak, Contributing Editor, "The Seybold Report"

3. Home/Family Microworld

Household Management *(9:00-10:00 a.m.)*

Micros for Organizations & Groups *(10:00-11:00 a.m.)*

Home Micro-Based Businesses *(11:00 a.m. - 12:00 noon)*
A. Richard Miller, Partner, Miller Microcomputer Services

Micros: Impact on Family Life, Kids & Recreation *(12:00 noon-1:00 p.m.)*
Dan Oehlsen, Executive Producer, Children's Computer Workshop

Over 100 Professional Exhibits at EMCE

EMCE exhibits offer the latest in business-oriented hardware, software, peripherals, systems, accessories and resources from a wide selection of suppliers including companies like IBM, Digital Equipment Corporation, BASF Systems Corp., Computerland, Addison Wesley, GRID Systems, Micro Systems International, Key Software and Victor Electronics . . . to name just a few. EMCE's designed for you to see, touch and learn what you need to know about micros. **Your conference registration includes complete, 3-day exposition attendance.** Or you can sign up for the exhibits only. If you register in advance, using the form in this ad, you get two bonuses:

1. **Early admission** — only conference registrants and advanced registrants will be admitted to the hall between 11 a.m. and NOON on Thursday and Friday.
2. **$5.00 discount** on admission price.

Register for EMCE now! The Sheraton Centre in New York City is the place; June 23-25, 1983 are the dates. Exposition hours: 11-7, Thursday and Friday; 10-6, Saturday. For more information on the conference and exposition, dial 1-800-225-4698 (In Massachusetts, 617-879-0700) and ask for Louise Myerow.

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- ☐ Executive Microcomputer Workshop* $595
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  Choose one: ☐ Apple ☐ IBM PC
- ☐ Micros in Education $ 95
  Sat. June 25

*Includes Saturday Special Features Programs

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Registrations Cancelled later than June 15 are subject to a $50.00 service charge. Registration may be transferred at no charge.

EMCE — Sheraton Centre, New York City June 23-25, 1983 EMC3

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- ☐ Advance *Pre-Paid 1 day exhibit* registration $10 ($15 at door)
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3-Day Exhibit Registration Includes Special Feature Sessions on Saturday, June 25th from 9:00 a.m. to 1:00 p.m.

You must enclose your check or charge information. We cannot bill you or take your exhibit registration over the phone. Exhibit registration is non-refundable.

find a vice-president earning $40,000 who speaks Swahili and is willing to transfer to Bahrain, he can find him instantly on the system."

As in most corporations, word processing was the precursor to office automation at Chase. Although IBM and Digital Equipment Corp. systems are widely used, the bank is a huge Wang-based organization.

Chase has since incorporated the business-oriented Wang VS system throughout the organization and has installed Wang's Mailway electronic mail package as well.

Communication with Chase's overseas operations was the spearhead for the widespread installation of electronic mail capabilities throughout the bank. According to Martin Goldman, vice-president of system services, there are already 1,000 "mailboxes" on line. In some cases, one mailbox may serve an entire work section, which means that many more than 1,000 employees are using electronic mail.

Communication between European and U.S. offices of the bank has been made faster and cheaper. Prior to electronic mail, a pouch mail system was used between the continents, requiring messages to travel two days there and two days back. With electronic mail, the process has accelerated to overnight turnaround, Goldman said.

The success of the overseas operation sparked positive reaction in domestic offices. Goldman surveyed the 24 major corporate groups at Chase and found 12 were "highly interested" in electronic mail.

Starting a year ago, he initiated a three-pronged approach to the network. "Twenty-three of the 24 corporate groups had Wang equipment, so it was a viable first step. The next step was to integrate other vendors' systems into the electronic mail system. Electronic mail does not cost-justify itself as hardware, so we decided to make use of the equipment base at the bank today. If someone has DEC [equipment], we should be able to hook them onto the system."

"If someone wants to send something to 10 other people, he shouldn't have to worry about what system they are on," Goldman stated. "The challenge is to make the system transparent to the end user."

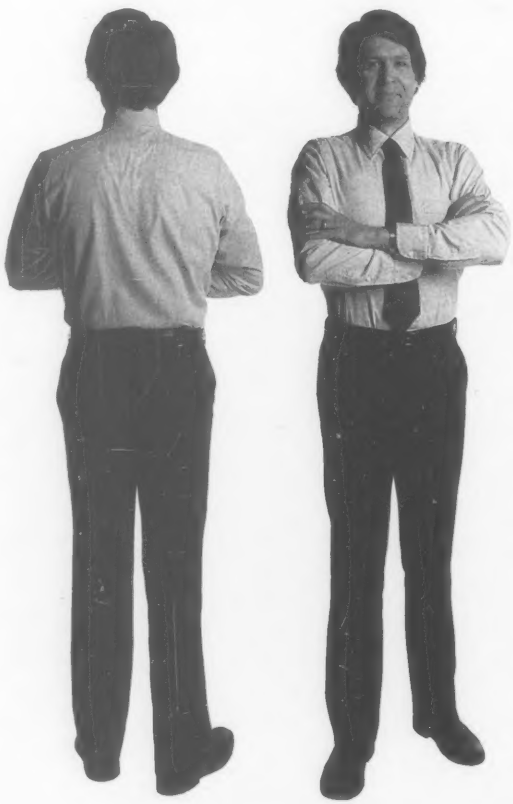
At Chase, each section or corporate group pays its own way into electronic mail. The commitment to electronic mail is strong throughout the organization, and cost-justification is not an issue, he maintained. "We're not playing a numbers game. We just want some percentage of the major communicators to use the system."

A major effort is currently under way to link together four of Chase's downtown Manhattan facilities in a local-area network. According to Ron West, vice-president of telecommunications planning, the broadband cable network will create an infrastructure that will provide reliable multipurpose network support for data communications, electronic mail, teleconferencing, videoconferencing and facsimile transfer as well as better security. "We should have Phase I, which is the hookup of three buildings with several hundred outlets, in place by mid-year," he said.

The project, costing "several hundred thousand dollars — not including equipment" is being funded on a central corporate level. However, in the end, Chase's plans include establishing a "user-liaison network," in which use of the local-area network is charged back to the user. "It will be like paying a phone bill," West explained.

Chase's long-range goal is to establish a hybrid capability linking voice and data communications in an office-of-the-future environment. "We will have digital PBX technology as well as a broadband-based distribution facility. We won't put all our eggs in one basket," he said. As the bank goes beyond Phase I into Phase II, the local-area network will roll out to other building sites, eventually "gatewaying to distant areas" and integrating with the "pocket-based environments" on both an international and domestic level.

"The commitment to electronic mail is strong throughout the organization, and cost-justification is not an issue."



Anderson, who is active in the overall OA strategy planning for Chase, is overseeing the bank's implementation of videoconferencing facilities. Anderson has done extensive research on videoconferencing facilities and has visited many organizations with the technology already in place. As she sees it, it is a technology worth investigating thoroughly because "at half a million dollars per room, you're either into it or you're not. There's not much chance for experimenting."

Chase Manhattan has made the commitment to videoconferencing and, by the end of 1983, plans to have at least two rooms in use. According to Anderson, there will be a facility in the Manhattan corporate headquarters. The second site has not been confirmed, but will possibly be in San Francisco, Boston, Houston, or Lake Success, the bank's Long Island, N.Y., facility.

The goal of videoconferencing is straightforward: to increase communications capabilities while cutting travel time and expenses. Anderson expressed the frustrations executives face with the demands of traveling: "When you look at travel decisions, you realize the problems that constantly come up. Either they're busy or you're busy. And traveling becomes a real burden as well. It's fun to go to London once, but after 10 times, it's no longer fun. You still need face-to-face contact every once in a while — the slap on the back and the handshake — but videoconferencing can really cut down on most of the traveling and can get decisions made more rapidly."

In an organization the size of Chase, the personal computer is as inevitable as the coffee break. Verdino oversees the merging of the micro and the OA environment; with the diverse offerings of vendors and widespread Chase locations, it is a challenging task..

"We want to integrate our resources as much as possible into office automation," he said. "We'd like to adapt and standardize if we can, but we haven't committed to any specific brands. We lean toward those that best serve Chase's needs. Our tendency is go with IBM, DEC or Wang, but we're open to the box that offers us the best business objectives."

Approximately 450 personal computers presently are installed at Chase locations worldwide, and 90% of them are in the New York offices. Most are Apple Computer, Inc. and IBM personal computers.

Although Chase would like to see certain guidelines and standards adhered to in the personal computer influx, Verdino is quick to state that the OA strategy group will only suggest, not dictate, policy. "We just want to provide end users with the tools they need. Most of our requests come at the official level, and they realize if they want to play in this arena, there need to be some standards to get compatibility."

"The Chase OA strategy during the five-year period will be in support of the activities performed by the executive and the professional."

The personal computers are widely used for such applications as spreadsheet, word processing data base management and as terminals to download from timesharing. Hesitant to predict specific numbers, Verdino said he believes the number of personal computers will "certainly double every year."

Though Chase's top executives, such as Chairman Willard Butcher and President Thomas Labrecque, have voiced strong support for the OA surge within the bank, the movement of technology into the executive suite has been moderate.

Using the Wang VS system, one of Chase's OA planners built in both a contact file and a calendaring system for the bank's executives. However, it is rare to find a top Chase executive at a desktop terminal. Lambo said he feels the best way to filter OA to the top is through education: "The key is to demonstrate the various uses to them. Once they see what can be done, they'll want it."

The Chase OA strategy, in its five-year forecast, is committed to executive support. "A major thrust of the programs during the five-year period will be in support of the activities performed by the executive and the professional," the report said. "The individual will be provided with electronic

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means to perform computations, gain access to a variety of data bases, manage records and control his personal activities, such as calendar keeping, tickler files and scheduling. These functions will also be available on portable workstations and with informations graphics capability."

Anderson, however, questions the need for getting the executive on line. "Is it really necessary for an executive to sit at a terminal and generate information? As younger people who have been exposed to the technology move up, things will change. But now, many executives don't know how to transfer a phone call, and I wonder if they even want to.

"I'm not sure, in the executives' minds, it is an issue. Can they get information faster? They get it fast enough now. All they have to do is pick up a phone and it will be there for them. I simply don't see an executive workstation that meets the needs out there yet."

"The greatest frustration for Chase planners is the lack of technology to meet their needs."

In fact, the greatest frustration for planners is the lack of technology to meet their needs. Lambo is looking forward to the product that integrates all the functions essential to productive OA. "The ideal product would have a friendly user interface — some simple device that combines voice with something like a mouse. It would interface with you in a variety of ways and have the power to access information at two levels — your own and the data bases you need for your business. This would all have to link up with your administrative support automatically.

"The vendors are trying, but the future hasn't caught up with their promises yet," he added.

Despite the technology gap, Lambo and Anderson are pleased with Chase's OA progress. Along with such key installations as local-area networks and electronic mail, Chase has invested a great deal in voice store-and-forward systems and extensive telecommunications networks as well as human factors and the open office environment.

Although the Chase OA strategy report points out that "there is no clear leading bank across the board in the office automation area," Anderson, with a veteran's eye to industry trends, said she feels Chase is "running very well" in comparison to other financial institutions.

Lambo takes a pragmatic view of the operation: "The first step was word processing, and we're substantially down that road. In supporting management levels, we're about 10% to 15% where we want to be. We're about 50% of the way with document exchange and about 10% with electronic mail. In some cases, we've implemented nothing, but are well on track. Overall, I'm much more satisfied than I was a year ago."

Anderson maintained that the key to success is the consistent buildup of data bases. "If we don't build a solid data base of information," she stated, "the access tools are worthless. You can get excited about the bells and whistles, but what you're really after is information." OA

Rifkin is a staff writer for Computerworld OA.

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TECHNOLOGY

RYE BROOK, N.Y. — Using NCC '83 as a backdrop, **IBM** introduced its System/36, a small business system that combines data processing, word processing, business color graphics and office management functions and reportedly has more application programming than any previous IBM small business system. The system is an upgrade to the System/34 and is said to have up to twice the internal storage and one and a half times the direct storage.

System/36 is available for $34,000 for a basic system with 128K bytes of memory, 30M bytes of disk storage, two displays, one printer and the operating system. Prices for additional equipment can bring the price up to $176,000. More information is available from IBM Information Systems Group, 900 King St., Rye Brook, N.Y. 10573.

ANAHEIM, Calif. — **Xerox Corp., Visicorp. and 3Com Corp.** unveiled plans at NCC '83 for a joint project that will allow users of IBM Personal Computers equipped with Vision software to have direct access to services on the Ethernet local communications network.

The plan calls for Xerox to develop network applications for the Vision software system, making Ethernet services accessible. Visicorp, the developer of Vision, will market these Ethernet network applications worldwide to run with Vision on the IBM Personal Computer. 3Com, a supplier of Ethernet software and hardware for personal computers, will provide the direct hardware and protocol software connection to the Ethernet network for the IBM Personal Computer.

For more information contact Xerox Corp., 701 S. Aviation Blvd., El Segundo, Calif. 90245.

LOWELL, Mass. — **Wang Laboratories, Inc.** announced several enhancements for its Professional Computer, including a local-area network, a voice attachment, the UCSD P-System and new third-party software.

The Local Interconnect Option reportedly allows clustering of Professional Computers via a high-speed local-area network. The local net can support users at distances up to four miles.

The connection costs for a typical eight-user configuration will be approximately $500 per workstation, Wang said from One Industrial Ave., Lowell, Mass. 01851.

SUNNYVALE, Calif. — **Anderson Jacobson, Inc.** introduced two versions of a 20-lb. portable computer intended for business applications. The 16-bit system, called the AJ Passport, contains 256K bytes of memory, two disk drives storing 320K bytes each and a 7-in. amber display with an optional 12-in. external monitor.

The first Passport features two diskette drives, a parallel printer port, 300 bit/sec modem and operating system and applications software. The first model is available for $4,500.

The second comes with a single diskette drive and costs $3,000 from the firm at 1065 Morse Ave., Sunnyvale, Calif. 94086.

WALTHAM, Mass. — With the introduction of their Microsystem 6/10, **Honeywell, Inc.** entered the microcomputer field. The new system,

Honeywell's Microsystem 6/10

which is fully compatible with the company's line of minicomputers, reportedly has extensive networking capabilities and offers a personal computing option.

The Microsystem 6/10 contains a 16-bit microprocessor, the Honeywell Micro 6, and also offers a 16-bit Intel 8086 processor option that supports the MS-DOS and CP/M 86 operating systems. It has 128K bytes of random-access memory, two asynchronous ports, a 12-in. monitor and a detached keyboard.

The desktop version of the Microsystem 6/10 is priced at $3,995 and the hard-disk model at $9,995 from Honeywell, Inc., 200 Smith St., Waltham, Mass. 02154.

KING OF PRUSSIA, Pa. — **Commodore Business Machines** unveiled its first portable computer, the Executive 64.

The 27.6-lb. system, which features 64K bytes of memory, a single built-in 170K-byte disk drive and a 6-in. monitor, is priced at $995.

A dual disk drive version costs $1,195 from Commodore Business Machines, 681 Moore Road, King of Prussia, Pa. 19406.

ROCHESTER, N.Y. — **Xerox Corp.** unveiled three office systems as part of Phase 2 of its Ethernet network integration program. Included in the announcement were a desktop interface unit, the Shared Interface Unit (SIU), that allows the Xerox 820-II personal computer to share direct access to Ethernet; Version 4.0 of its network software for the Xerox 8010 system and Ethernet-based 8000 network; and an information system that allows users to create documents and send electronic mail in nine languages.

The SIU, including software, is priced at $1,500. For more information contact Xerox Office Products Division, 1341 W. Mockingbird Lane, Dallas, Texas 75247.

There is no charge for the 8010's 4.0 software release, according to the vendor, and prices for language software will vary according to the language. More information is available from Xerox Office Systems Division, 3333 Coyote Hill Road, Palo Alto, Calif. 94304.

HAYWARD, Calif. — The Executive, a new portable computer with a 7-in. CRT screen, has been introduced by **Osborne Computer Corp.**

The Executive reportedly addresses many of the criticisms of the company's first portable, the Osborne I. The Executive features an 80-char. display and emulates the IBM 3270, 3780, 2780 and 3741 terminals as well as the X.25 communications protocol.

The Executive weighs 25 lbs, one more than the Osborne I, and is available for $2,495 from Osborne Computer Corp., 26500 Corporate Ave., Hayward, Calif. 94545.

DETROIT — **Burroughs Corp.** introduced two electronic workstations, the ET1100 and the ET2000. Both systems reportedly feature electronic mail, word processing and other functions when connected to any Burroughs mainframe. The ET1100 is a general-purpose input and display system compatible with installed Burroughs smart display systems. It features a 14-in. CRT with 26 lines containing 80 characters.

The ET2000 is a programmable workstation with all the features of the ET1100 plus Microsoft, Inc.'s MS-DOS operating systems to allow users to program local and data communications applications.

The ET1100 is $1,895; the ET2000 from $4,095 to $7,195 from Burroughs Corp., Burroughs Place, Detroit, Mich. 48232.

MELBOURNE, Fla. — **Harris Corp.**, with plans to enter the office automation marketplace, unveiled the Harris 9000 Series, a family of integrated word processing and data processing office systems. The Series reportedly will consist of stand-alone WP and professional computing workstations as well as clustered systems that can be interconnected via

Harris' Workstation

local-area networks to support multiple work groups.

The product family will consist of the 9010 Standalone Word Processor; 9015 Professional Computer; 9020 Mini Cluster; 9050 Cluster; 9060 Dual Cluster; and 9070 Network Systems.

Prices range from $9,500 for a stand-alone system with printer, to $84,000 for typical cluster consisting

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of eight workstations and four printers. More information is available from Harris Corp., Word Processing Division, P.O. Box 2400, Melbourne, Fla. 32901.

SECAUCUS, N.J. — Utilizing what is reported to be the first erasable optic disk system, **Matsushita Electric Industrial Co., Ltd.** and **Matsushita Graphic Communication System, Inc.** have announced their Optical Document File System.

The system is said to record 10,000 letter-size documents on an 8-in. optical disk by using semiconductor laser technology and interface to a facsimile machine for transmission of recorded information. Marketing of the product in the U.S. will be handled by Panasonic Industrial Co.

The file system is available for $70,000 to $100,000 from Panasonic, 1 Panasonic Way, Secaucus, N.J. 07094.

NEEDHAM, Mass — **McCormack & Dodge Corp.** (M&D) introduced the Interactive PC Link, a link between the IBM Personal Computer and its mainframe financial software data bases. The bisynchronous link offers downloading of selected files to the Personal Computer and real-time uploading of files for updating the mainframe data base. The link runs in conjunction with the company's Advanced Financial Systems design methodology under Hilite, an on-line query system for M&D financial packages.

The Interactive PC Link is available for $25,000 per mainframe CPU with an additional charge of $2,500 per IBM Personal Computer, the vendor said.

More information is available from McCormack & Dodge, 560 Hillside Ave., Needham Heights, Mass. 02149.

WOODLAND HILLS, Calif. — The first software product of a joint development agreement between **Visicorp** and **Informatics General Corp.** is a link between IBM Personal Computers and IBM mainframes. The components of the software include two cooperating software packages from the companies: Visianswer, a new package from Visicorp that operates on the IBM Personal Computer, and Answer/DB, an existing Informatics product that runs on any IBM mainframe or plug-compatible mainframe.

The initial version of the product will communicate using a proprietary asynchronous link protocol. The U.S. purchase price of a typical configuration, consisting of an Answer/DB module on a single mainframe and Visianswer for 50 Personal Computers, will be $45,000. Both vendors will be marketing the product.

For more information, contact Visicorp, 2895 Zanker Road, San Jose, Calif., or Informatics, 21031 Ventura Blvd., Woodland Hills, Calif. 91364.

SAN ANTONIO, Texas — The Model 8625, **Datapoint Corp.'s** lowest priced member of its 8600 series of 16-bit minicomputers, was unveiled recently.

The new version features a 10M-byte hard disk and 1M-byte diskette storage device, as well as an interface to the company's Attached Resource Computer local-area network. The Model 8625 is based on the firm's 8602 processor and is compatible with other systems in the firm's minicomputer line.

It is priced at $14,950 from Datapoint Corp., 9725 Datapoint Drive, San Antonio, Texas 78284.

CAMPBELL, Calif. — A battery-powered, 9-lb 16-bit "mobile computer" has been introduced by **Gavilan Computer Corp.**

The portable system reportedly integrates both proprietary multi-functional software and industry standard MS/DOS operating system software with the lightweight hardware. It can operate up to eight hours on its rechargeable batteries and can be connected to ordinary power outlets,

Gavilan's Micro

according to the vendor. The microcomputer has an integrated touch panel or "solid-state mouse" that moves a pointer on the screen to the file or item desired. The product will be marketed initially as a direct OEM product or via distributors.

The basic system will reportedly be available for less than $4,000 from Gavilan Computer Corp., 240 Hacienda Ave., Campbell, Calif. 95008.

AUSTIN, Texas — IFPS/Personal, a distributed DSS package for IBM Personal Computers, was introduced by **Execucom Systems Corp.** The new software was designed to work with Execucom's mainframe-level Interactive Financial Planning System (IFPS). IFPS/Personal is reportedly the first DSS product to offer a nonprocedural modeling language for use on a personal computer. The package will be sold initially to organizations that already have or will purchase mainframe-level IFPS.

IFPS/Personal is priced at $20,000 for a minimum of 10 copies from Execucom Systems Corp., 3410 Far West Blvd., Austin, Texas 78731.

FORT WORTH, Texas — **Radio Shack** unveiled its Model 100, a 4-lb portable computer with built-in software, built-in modem and a full-size typewriter keyboard with eight programmable function keys.

Made by Kyocera of Japan, the Model 100 is programmable in Microsoft, Inc.'s Extended Basic and is based on Intel Corp.'s 8085 processor. It has 8K bytes of random-access memory and 32K bytes of read-only memory.

The Model 100 is available for $799 from Radio Shack, 1800 One Tandy Center, Fort Worth, Texas 76102.

SAN JOSE, Calif. — **Sydis, Inc.** has introduced a desktop integrated office system, the Voicestation. The product features voice integrated with

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data, text and graphics and has been designed to replace virtually everything on the manager's desk, the vendor said. The Voicestation has a voice store-and-forward capability and operates over existing twisted-pair telephone lines. It is supported by the Sydis Information Manager (SIM), a 68000-based multiprocessor system that will support from eight to 300 workstations. Sydis will sell its product primarily through the OEM and large end-user market, and a typical configuration will cost from $6,000 to $7,000 from Sydis, Inc., 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

WESTBORO, Mass. — The Avatar TC100 system from **3R Computers, Inc.** is a dual processor system that reportedly transforms all asynchronous and IBM 3278-class terminals into intelligent workstations with both CP/M and MS/DOS personal computing capabilities. In the online mode, the Avatar TC100 allows normal terminal to computer functionality; in the local mode, it delivers full computing capability with local data storage and host computer communications, according to the vendor.

Avatar TC100 features a single board, shared memory architecture with both a Z80 and Intel 8088 microprocessor with 128K bytes of random-access memory, and is priced from $2,195 from 3R Computers, Inc., 18 Lyman St., Westboro, Mass. 01581.

BOULDER, Colo. — **NBI, Inc.** introduced the NBI System One product family, a group of office automation products designed for use by professionals and managers. The system consists of an Integrated Work Station and Integrated System Server; the Oasys 4000 series of ergonomically designed OA workstations; the Oasys 2000 series; and NBI Net, a local-area network that links OA devices. The System One workstation is priced at $12,500; the Integrated System Server at $29,500; the Oasys 2000 workstation for $2,995; the Oasys 4000 at $4,400; and each NBI NET connection will be approximately $900 and available sometime in 1984, the vendor said.

NBI also introduced NBI Word Processing, professional-level WP software for the personal computer. Compatible with the IBM Personal Computer, the IBM XT and the Compaq Portable Computer, it will reportedly create documents that can be communicated with NBI's Oasys products. NBI Word Processing includes an NBI coprocessor board, has 64K bytes of memory and provides memory expansion for other personal computer tasks. It costs $695 from NBI, Inc., P.O. Box 9001, Boulder, Colo. 80301.

SAN JOSE, Calif. — Three format interfaces accommodating Wang, Exxon and Lanier word processors were announced by **Dest Corp.**

The interfaces allow Dest's Workless Station to automatically enter documents into Wang VS, Alliance, WPS and OIS WP models; Exxon 510/520; and Lanier word processors.

The interfaces are available for $1,495 each from Dest Corp., 2380 Bering Drive, San Jose, Calif. 95131.

SANTA CLARA, Calif. — **Plexus Computers, Inc.** announced a Unix-based Network Operating System (NOS), which employs Ethernet hardware, and a Virtual Protocol Machine (VPM) facility implementation under Unix. Also announced was that remote job entry (RJE) applications are supported immediately under its implementation of VPM. RJE uses the Hasp multileaving workstation protocol.

The NOS is available for $1,500 per Plexus system, and RJE for $750 from Plexus Computers, Inc., 2230 Martin Ave., Santa Clara, Calif. 95050.

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June 20-22, San Francisco — **Office Automation: Strategic Planning, Design and Implementation.** Also, Atlanta, July 25-27. Contact: Datapro, 1805 Underwood Blvd., Delran, N.J. 08075.

June 20-22, New York — **Improving Office Productivity: Principles and Practices.** Also, San Francisco, July 25-27. Contact: Datapro, 1805 Underwood Blvd., Delran, N.J. 08075.

June 21-24, Philadelphia — **Local-Area Networks.** Also, Boston, July 12-15; Washington, D.C., July 26-29; and Los Angeles, Aug. 2-5. Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

June 21-22, New York — **The Real OA Battle: Automating Professionals, Managers and Executives.** Also San Francisco, June 28-29. Contact: The Yankee Group, 89 Broad St., Boston, Mass. 02110.

June 23 — Washington, D.C. — **Turning Information Systems Into Competitive Weapons.** Also, New York, July 20. Contact: The Datamation Institute, Suite 415, 850 Boylston St., Chestnut Hill, Mass. 02167.

June 26-30, Chicago — **National Computer Graphics Associates Annual Conference.** Contact: National Computer Graphics, 8401 Arlington Blvd., Fairfax, Va. 22031.

June 27, Chicago — **Planning, Implementing and Managing the Information Center.** Also, New York, July 21. Contact: Datamation Institute, 850 Boylston St., Chestnut Hill, Mass. 02167.

June 27-29, Boston — **DSS 83: Third International Conference on Decision Support Systems.** Contact: Pat Van Cleve, DSS-83, P.O. Box 10001, Austin, Texas 78766.

June 28-29, Madison, Wis. — **Optical Storage of Information.** Contact: Department of Engineering & Applied Science, University of Wisconsin — Extension, 432 N. Lake St., Madison, Wis. 53706.

July 7-8, Washington, D.C. — **Local-Area Networks: Selection Guides.** Also, Chicago, July 28-29. Contact: Datapro, 1805 Underwood Blvd., Delran, N.J. 08075.

July 19-22, Dallas — **Planning for Office Systems.** Also, Los Angeles, August 16-19. Contact: IBM, Information Systems Management Institute, 3550 Wilshire Blvd., Los Angeles, Calif. 90010.

Aug. 2-3, New York — **Communications Strategy in the Year 1 A.D. (After Divestiture).** Also, San Francisco, Aug. 9-10. Contact: The Yankee Group, 89 Broad St., Boston, Mass. 02110.

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